Environmental Assessment

for

Construction of Multiple Roadway Improvement Projects

MacDill AFB, Florida

Headquarters Air Mobility Command

Scott AFB, IL

January 2011

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JAN 2011		**00-00-2011 to 00-00-2011**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Environmental Assessment for Construction of Multiple Roadway Improvement Projects MacDill AFB, Florida	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **ATC Associates, Inc,5602 Thompson Center Court, Suite 405,Tampa,FL,33634**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**190**	

FINDING OF NO SIGNIFICANT IMPACT
AND
FINDING OF NO PRACTICABLE ALTERNATIVE

CONSTRUCTION OF MULTIPLE ROADWAY IMPROVEMENT PROJECTS
MACDILL AIR FORCE BASE, FLORIDA

Background: Pursuant to the President's Council on Environmental Quality (CEQ) regulations, Title 40 Code of Federal Regulations (CFR) Parts 1500-1508, as they implement requirements of the National Environment Policy Act (NEPA) of 1969, 42 U.S.C. § 4321, et seq., and Air Force Environmental Impact Analysis Process, as promulgated in 32 CFR Part 989, USAF conducted an assessment of potential environmental consequences associated with implementation of the following Proposed Action: Construction of Multiple Roadway Improvement Projects. The Environmental Assessment (EA) considered all potential impacts of proposed action and alternatives, both as solitary actions and in conjunction with other proposed activities. This Finding of No Significant Impact (FONSI) summarizes the results of the evaluation and the conclusions regarding significance of impacts from Proposed Action. The Finding of No Practicable Alternative (FONPA) summarizes conclusion reached regarding location of Proposed Action in a floodplain.

Proposed Action: Proposed Action includes several roadway improvement projects and construction of a new parking lot. The roadway improvement project, SOCOM Memorial Drive extension, would extend SOCOM Memorial Drive and create a direct connection between Hillsborough Loop Drive and South Bayshore Boulevard, just north of the existing Chevron Park housing area. This project would also remove existing intersection and traffic signals where Tampa Point Boulevard connects to Bayshore Boulevard.

The Zemke Avenue extension project would construct a new roadway between the eastern end of Zemke Avenue and Bayshore Boulevard. This project would also remove CENTCOM Avenue, located just north of Zemke Avenue. Eliminating CENTCOM Avenue would improve antiterrorism/force protection efforts by reducing reaction time for Security Forces personnel responding from the Bayshore Gate.

The South Boundary Boulevard widening project involves widening South Boundary Boulevard between Building 552 and Zemke Avenue. The project would involve construction of a culvert extension in a drainage ditch, a jurisdictional wetland, to permit the roadway to cross the ditch.

The Great Egret Avenue extension project would connect the east end of Great Egret Avenue to South Boundary Boulevard just south of the intersection with Zemke Avenue. This project would involve construction of a culvert in a drainage ditch, a jurisdictional wetland, to permit the roadway to cross the ditch. This roadway project would bisect the northern portion of the north flight apron and would also require relocation of the aircraft Wash Rack facility located at the north end of the flight apron.

The relocation of Aircraft Wash Rack project would relocate the Wash Rack on existing pavement, southwest of the existing location in order to complete the Great Egret Avenue extension. The new sanitary sewer, stormwater, and drinking water lines would connect to the sanitary sewer, stormwater, and drinking water lines at the existing Wash Rack.

A parking lot construction project would create a 10,000 square-foot permanent parking lot complete with curbing, striping, and stormwater treatment/attenuation areas. The proposed location for construction of the new permanent parking lot is presently unpaved, unimproved vacant land and currently functions as a temporary parking lot.

Other roadway improvements include the following improvements: (1) providing left turn lanes along Hangar Loop Drive; (2) widening Bayshore Boulevard which would involve the construction of a culvert extension to the existing culvert to cross a drainage ditch, a jurisdictional wetland; (3) adding left and/or right turn lanes along Bayshore Boulevard south of Tampa Point Boulevard (or SOCOM Memorial Way Extension); and (4) adding traffic signals at the Bayshore Boulevard/Florida Keys Avenue Intersection.

Alternatives: The alternatives to the Proposed Action include variations on the final design and include: modifications to the alignment of Tampa Point Boulevard in lieu of closing the northern terminus of Tampa Point Boulevard at Bayshore Boulevard; utilizing the previous one-way roadway system between South Boundary Boulevard and Florida Keys Avenue to improve capacity along Hangar Loop Drive and Hillsborough Loop Drive in lieu of constructing left hand turn lanes along Hangar Loop Drive; relocation of the Wash Rack facility to a location on pervious vacant land that would require utility infrastructure; three alternate sites for the proposed parking lot. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action.

Under the No Action Alternative, there would be no construction of any of the proposed roadway improvement projects. This alternative would result in continued traffic congestion, especially during morning and evening rush hour, along South Boundary Boulevard around the USCENTCOM Complex. The No Action Alternative is not the preferred alternative.

Summary of Findings: The environmental consequences associated with implementation of the Proposed Action are summarized below and are discussed in detail in Section 4.0 of the EA.

Air Quality: Construction vehicle exhaust would be generated during construction as a result of the Proposed Action; however, these emissions would not constitute a major source of air pollutants. The construction and operational activities that would occur as a result of the Proposed Action would have a negligible impact on the ambient air quality at MacDill AFB.

Noise: Noise levels would increase during construction, but potential impacts would be temporary and considered minor. The Proposed Action is not anticipated to create additional operational noise that would impact adjacent land uses.

Wastes, Hazardous Materials, and Stored Fuels: The Proposed Action would not result in significant impacts from hazardous materials or wastes. There would be no impacts to stored fuels with implementation of the Proposed Action.

Physical Environment: There will be no significant impacts to surface or ground water quality during construction and operation of the warehouse complex or the demolition of the septic system and drainfield.

Floodplains: MacDill Air Force Base covers 5,638 acres of land at the southern tip of the Interbay Peninsula. Approximately 80 percent of the land at MacDill, or 4,510 acres, is located in the coastal floodplain. The remaining 20 percent of the installation not located within the floodplain is used primarily for airfield operations and support activities. The roadway improvement project would add 58,000 square feet, or approximately 1.3 acres, of impervious surface. That increase represents the use of 0.03 percent of the total acreage located in the floodplain. Use of this negligible percentage of the total acreage located in the floodplain would not significantly impact the floodplain. Additionally, the project will not involve discharges of hazardous or sanitary wastewater to the floodplain or Tampa Bay. The roadway improvements would not be elevated above the 100-year floodplain, because it would be used solely for transportation. All practicable measures to minimize the impact of floods on human health, safety, and welfare, and preserve the natural values of the floodplains will be implemented for the project. These measures include the preservation of existing floodplain elevations, roadway and parking lot design and Best Management Practices (BMPs) such as retention ponds, temporary sediment basins, silt fencing, re-vegetation of disturbed areas, and berms. These activities are discussed in detail in Sections 4.4.1, 4.6.1.1, and 4.10.1 of the attached EA. Consequently, construction of the roadway improvements and parking lot would not increase the risk of flood loss or increase the potential flood impacts to human safety, health, and welfare.

Transportation Systems: The increase in traffic during the construction of the Proposed Action is expected to be minor and short-term. The use of the roadway improvements would have a minor beneficial long-term impact on transportation on MacDill AFB, since traffic flow on the main base would be improved. Therefore, implementation of the Proposed Action would have minor long term beneficial impacts on transportation at MacDill AFB.

Safety and Occupational Health: The proposed construction activities for the project would pose similar safety hazards to workers typically associated with industrial construction projects, such as falls, slips, heat stress, and machinery injuries. Construction would not involve any unique hazards and all construction methods would comply with Occupational Safety and Health Administration (OSHA) requirements to ensure the protection of workers and the general public during construction.

Socioeconomic Resources: Implementation of the Proposed Action would have a minor short-term economic benefit for the MacDill AFB region.

Biological Resources: Although the Proposed Action would impact wetlands, primarily through construction of a box culvert and the extension of two existing box culverts, adverse impacts would be avoided, to include the wetland communities of Tampa Bay. Further, adverse impacts

to wetlands, wildlife, aquatic life, and/or protected species would be avoided or result in insignificant impacts through the proper use of erosion and turbidity control structures and other BMPs such as permanent retention ponds, temporary sediment basins, silt fencing, re-vegetation of disturbed areas, and berms. Consultation with the US Fish and Wildlife Service indicates that there would not be adverse impacts on threatened or endangered species during construction of the multiple roadway improvement projects. There would not be a net loss of jurisdictional wetlands as a result of the project. Also, prior to commencing any ground disturbing construction activities, all appropriate and required federal, state or local governmental coordination, consultation and permitting will be pursued and obtained to include implementation of reasonable environmental protection measures or techniques and construction BMPs. Additional analyses of these activities are discussed in Sections 4.4.1, 4.6.1.1, and 4.10.1 of the attached EA.

Cumulative Impacts: There are no site-specific direct, indirect, or cumulative impacts associated with the Proposed Action. The construction and operational activities of the Proposed Action were considered in conjunction with other on-going or planned construction projects, and together they do not constitute significant cumulative adverse impacts.

Florida Coastal Zone Management: In accordance with the federal Coastal Zone Management Act (CZMA) and the Florida CZMA, this federal action must be consistent "to the maximum extent practicable" with the Florida Coastal Management Program (CMP). Appendix C to the EA contains the Air Force's Consistency Statement and finds that the conceptual Proposed Action and alternative plans presented in the EA are consistent with Florida's CMP. In accordance with Florida statutes, the Air Force submitted a copy of the attached EA to the State of Florida so that they can perform a coastal zone consistency evaluation. The State of Florida determined that, at this stage, the Proposed Action is consistent with the Florida CMP. The state's final concurrence of the project's consistency with the CMP will be determined during the environmental permitting stage of the project.

Finding of No Significant Impact: Based upon my review of the facts and analyses contained in the attached Environmental Assessment, incorporated by reference, I conclude that implementation of the Proposed Action would not have a significant environmental impact, either by itself or cumulatively with other projects at MacDill AFB. Accordingly, the requirements of NEPA and the regulations promulgated by the Council on Environmental Quality and the Air Force are fulfilled and an Environmental Impact Statement is not required. The *Tampa Tribune* published a Notice of Availability on December 16, 2010. Copies of agency coordination letters, project correspondence, and comments received from the agencies are included in Appendix B of the EA. No public comments were received.

Finding of No Practicable Alternative: Pursuant to Executive Order 11988 and 11990, the authority delegated in Headquarters Air Force Mission Directive (HAFMD) 1-18, and in AMC/CV Redelegation of Environmental Authorities letter dated 14 January 2005, and taking into consideration the findings of the EA, which is incorporated herein by reference, I find that there is no practicable alternative to the Proposed Action occurring in a floodplain and wetland. The Proposed Action includes all practicable measures to minimize harm to the environment. Based upon the environmental constraints and the nature of the roadway improvement projects,

there are no other available areas located on MacDill AFB that would satisfy the objectives of the Proposed Action. The Proposed Action, as designed, includes all practicable measures to minimize harm to the floodplain. The Air Force has sent all required notices to federal agencies, single points of contact, the State of Florida, local government representatives, and the local news media.

The signing of this combined FONSI/FONPA completes the environmental impact analysis process under US Air Force regulations.

J.H. Bonapart

23 MAR 11

JOHN H. BONAPART, JR., SES, ~~DAFC~~
Deputy Director, Installations and Mission Support
Headquarters Air Mobility Command
Scott Air Force Base, Illinois

Date

Attachment:
EA

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICIES

SECTION 1.0
PURPOSE OF AND NEED FOR PROPOSED ACTION

This Environmental Assessment (EA) examines the potential for impacts to the environment resulting from the Construction of Multiple Roadway Improvement Projects (MRIPs) at MacDill Air Force Base (AFB) (the Proposed Action).

The Proposed Action includes widening the primary artery that carries vehicles on and off-base, the extension of several interior roadways to provide improved traffic flow to existing exit points and to alleviate current commuter congestion points; and the construction of additional parking areas to relieve the parking shortages and improve pedestrian safety in the northeastern quadrant of the Base. This EA addresses the environmental effects associated with the construction of MRIPs at MacDill AFB, as well as alternatives to the Proposed Action.

1.1 MISSION

First established in 1939 as an Army airfield, MacDill AFB became an Air Force Base in 1948. The Base has undergone several mission changes and played a vital role in training and strategic defense. Since 1996, MacDill AFB has been host to the 43rd Aerial Refueling Group (ARG) which joined the 6th Air Base Wing to form the 6th Air Refueling Wing (6 ARW). With the addition of the Commander in Chief (CINC) Support mission in January 2001, the 6th ARW was redesignated the 6th Air Mobility Wing (6 AMW). The 6 AMW is the host unit at MacDill AFB and reports to the Air Mobility Command (AMC), headquartered at Scott AFB, Illinois. The mission of the wing is to provide worldwide air refueling and combatant commander airlift in support of the Air Force's Global Reach, Global Power mission and to provide support to Headquarters US Central Command (USCENTCOM), Headquarters US Special Operations Command (USSOCOM), and 53 other mission partners that call MacDill AFB home (http://www.macdill.af.mil/units/index.asp). In addition, the Base provides similar support to tenant agencies and the MacDill community, including over 116,000 retirees and their families (http://www.tampa.va.gov/about/index.asp). The organizational structure of 6 AMW consists primarily of a maintenance group, medical group, operations group, and mission support group.

1.2 PURPOSE OF AND NEED FOR PROPOSED ACTION

The purpose of this Proposed Action is to improve the flow of traffic near two of the four gates to the base, to create additional routes for commuters to access the three primary commuter gates, and to improve pedestrian safety along these roadways. Additionally, this Proposed Action is intended to reduce the number of commuters driving past the United States Central Command (USCENTCOM) Complex, and improve Anti-Terrorism/Force Protection (AT/FP) reaction time from the Base gates.

Traffic congestion at MacDill AFB continues to be an issue as base functions and tenant organizations continue to expand. The base population, which includes military personnel and their families residing on base, as well as a commuting population of staff and contract personnel, has grown from approximately 7,000 in 2001 to a current total of nearly 20,000. Since that time, traffic congestion has increased, and the need to improve Base traffic conditions has expanded. These needs are greatest in the vicinity of USCENTCOM, as the primary artery that carries vehicles on- and off-base (North/South Boundary Boulevard) borders the northern and the eastern sides of the USCENTCOM Complex. During peak hours pedestrians crossing South Boundary Boulevard frequently stop vehicular traffic, creating traffic congestion around the USCENTOM Complex.

Since the September 11, 2001, terrorist attacks, the mission expansion of USCENTCOM (as well as the other Commands located in this area of the Base) has resulted in a significant increase in staff, with a resultant shortfall of adequate parking. A mixture of temporary and permanent parking lots have been established within most of the green space along the eastern side of South Boundary Boulevard. These parking lots have proven to be inadequate to meet the needs of base operations and an increase in available permanent parking is needed. Reducing traffic flow near USCENTCOM would improve pedestrian mobility and safety for USCENTCOM personnel walking from parking lots or to and from the other nearby Command facilities. Reducing traffic flow near USCENTCOM would also be beneficial from an Antiterrorism/Force Protection (AT/FP) standpoint. Consequently, the multiple roadway projects would be constructed to meet the current and future mission needs and increase the efficiency of base operations.

1.3 LOCATION OF PROPOSED ACTION

The Proposed Action would take place at MacDill AFB, located in Tampa, Florida. The Base occupies approximately 5,630 acres and is in Hillsborough County adjacent to the City of Tampa, at the southern tip of the Interbay Peninsula. The installation elevation ranges from sea level to approximately 15 feet above mean sea level (MSL). Much of the Base is less than five feet above MSL, and wetland areas are common, especially mangrove wetlands. The Base is surrounded on three sides by Tampa Bay and Hillsborough Bay, and is bordered on the north by development within the City of Tampa. Land uses adjacent to the Base are a mix of single-family residential, light commercial and industrial designations. **Figure 1-1** is the location map of MacDill AFB. The proposed locations of the MRIPs, parking lot and relocation of an aircraft wash rack are within the northeastern corner of MacDill AFB. **Figure 1-1** also depicts the general location map for the MRIPs within the Base. **Figure 1-2** is the specific location map for the MRIPs at MacDill AFB.

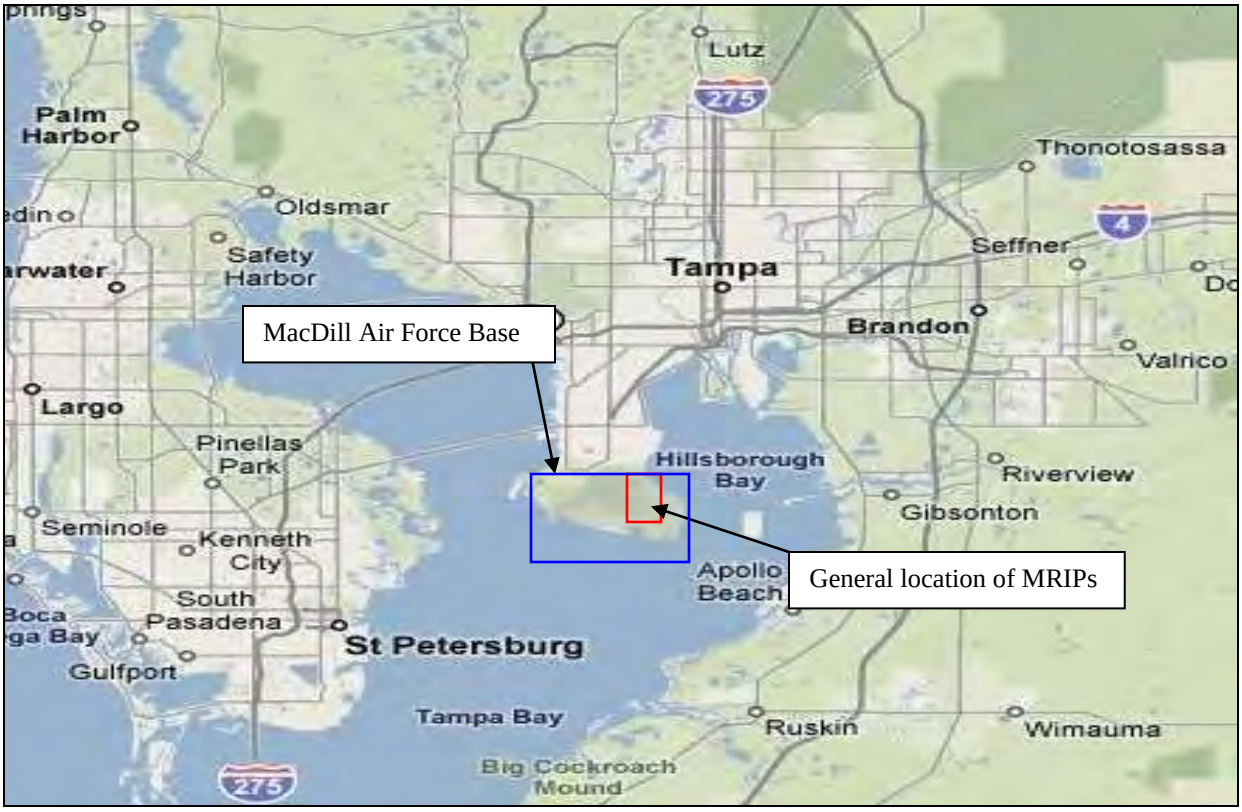

Figure 1-1 – Project Vicinity Map and General Location of Proposed Action

1.4 THE SCOPE OF THE ENVIRONMENTAL REVIEW

To initiate this environmental analysis, the 6th Civil Engineer Squadron Plans Programs and Production Flight (6 CES/CEP) submitted an Air Force (AF) Form 813, Request for Environmental Impact Analysis, to the 6th Civil Engineer Environmental Flight (6 CES/CEV) (**Appendix A**). The 6 CES/CEV determined the Proposed Action did not qualify for a categorical exclusion; therefore, an EA is required. This EA identifies, describes, and evaluates potential environmental impacts associated with MRIPs at MacDill AFB (the Proposed Action), as well as alternatives to the Proposed Action. This section discusses the issues evaluated during the environmental impact analysis process.

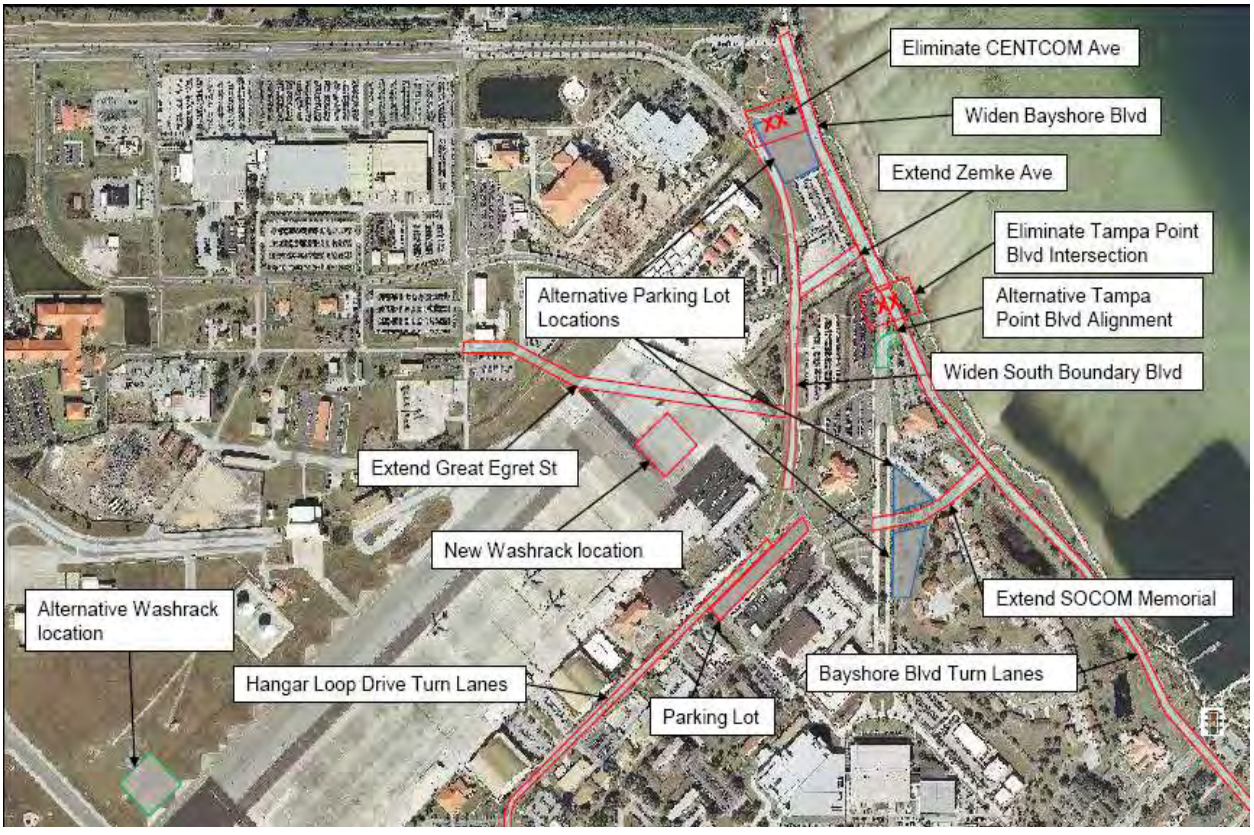

Figure 1-2 – Specific Locations of Proposed Roadway Improvement Projects

1.4.1 Issues Eliminated from Further Analysis

Based on the scope of the Proposed Action, and the No Action Alternative, as well as preliminary analyses, the Air Force eliminated the following issues from further analysis.

1.4.1.1 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 requires that federal agencies analyze the impacts of federally directed or funded undertakings on historic properties. According to the MacDill AFB Integrated Cultural Resources Management Plan (ICRM), dated September 2006, (USAF, 2006a) no significant cultural resources, including archeological sites or historic structures, are located in the vicinity of the Proposed Action. In accordance with Section 106 of the National Historic Preservation Act, the United States Air Force (USAF) accomplished consultation with the State Historic Preservation Office (SHPO) to confirm that the Proposed Action would not impact historic resources **(Appendix B)**. Consequently, the Air Force excluded cultural resources from any further analysis.

If any work not included as part of the Proposed Action or the proposed alternative put forward in this EA is required in the future, these plans must be coordinated with 6 CES/CEV prior to their approval and implementation.

1.4.1.2 Land Use

MacDill AFB designates land use as one of the following: airfield, urban, industrial, light industrial, commercial, institutional (educational & medical), residential, recreational, or improved vacant land. The Proposed Action sites are industrial land use areas, with the exception of the Great Egret Avenue extension across the north flight apron and the extension of SOCOM Memorial Drive adjacent to the Chevron Park residential area. The flight apron is an airfield land use. The Chevron Park residential area is a residential land use. The Proposed Action would not significantly alter land use at any of the MRIPs sites. Consequently, the Air Force did not conduct further analysis for potential land use impacts.

1.4.1.3 Environmental Justice

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* assures that federal agencies focus attention on the

potential for a proposed federal action to cause disproportionately high and adverse health effects on minority populations or low-income populations. Preliminary review revealed that no environmental justice areas of low-income and/or minority populations were located immediately adjacent to the Proposed Action sites. The MRIPs sites are located along vehicular corridors on military property. The closest off-base residential areas are approximately one quarter-mile from the nearest part of the Proposed Action. As described in the Installation Development Environmental Assessment for MacDill AFB, the 2000 Census evaluated the 12 census tracts located adjacent to the base fence line. Tracts 70 and 72, adjacent to the northwestern boundary of the base, were identified as having the highest ethnic populations (24.2% and 28.6% respectively) and the lowest per capita incomes of the 12 tracts evaluated.

To ensure compliance with EO 12898, the USAF examined and compared the ethnicity and poverty status in areas adjacent to the base to the regional and state statistics to determine if the Proposed Action would disproportionately affect minority or low-income groups. USAF operations, land management practices, vehicular traffic, and off-site emissions sources outside the base influence the environment around MacDill AFB. An increase in air emissions is not anticipated as a result of the Proposed Action. The construction associated with the Proposed Action would be performed by outside contractors, with employees living within the region of influence (ROI) and Tampa-St. Petersburg metropolitan area. The USAF did not identify any disproportionate impacts on minority or low-income populations from the Proposed Action.

In addition, EO 13045 requires that Federal agencies identify and assess environmental health and safety risks that might disproportionately affect children. The Proposed Action would not pose any adverse or disproportionate environmental health or safety risks to children living near the base. Safety precautions routinely employed during construction activities, such as construction fencing, will be applied to ensure that the Proposed Action does not pose any adverse health of safety risks to children, nearby residents, military personnel, and/or any other person on base. No significant adverse effects would be expected. Consequently, the Air Force excluded environmental justice from any further evaluation.

1.4.1.4 Socioeconomics

The Economic Impact Region (EIR) for MacDill AFB is the geographic area within a 50-mile radius of the base subject to significant base-related economic impacts. According to the 2002 Economic Resource Impact Statement for MacDill AFB (USAF, 2003), the total economic impact of MacDill AFB on the EIR was $5.59 billion with over 133,000 jobs supported. Retiree income provides an economic impact of $2.13 billion. The direct impact on local income produced by base expenditures is $1.2 billion.

The Proposed Action would cost over $6.2 million to construct, based on the following 2010 AF cost estimates: SOCOM Memorial Drive extension project (NVZR100035) ~ $500,000; Zemke Avenue extension project (NVZR100033) ~ $1,000,000; South Boundary Boulevard widening project (NVZR100047) ~ $1,000,000; Great Egret Avenue extension project (NVZR100036) ~ $1,000,000; and Relocation of the Aircraft Wash Rack (project number NVZR100042) ~ $740,000. The programmed costs for the proposed parking lot (project number NVZR050254), and the Other Potential Roadway Improvements (project number not yet assigned) have not been determined; for the purpose of this EA an estimated cost of $2,000,000 was assigned for these projects. In total this would equal less than 1 percent of the nearly $1.2 billion annual expenditures that MacDill AFB provides to the local economy, and would therefore constitute a minor short-term beneficial impact on the work force in the region during the construction period. No significant adverse effects on socioeconomics would be expected. Consequently, the Air Force excluded socioeconomics from any further evaluation.

1.4.1.5 Asbestos and Lead-Based Paint

The Proposed Action does not involve the demolition of facilities containing asbestos or lead-based paint. Therefore, the Air Force excluded asbestos or lead-based paint from any further evaluation.

1.4.2 Issues Studied in Detail

Preliminary analysis based on the scope of the Proposed Action and the No Action Alternative identified the following potential environmental issues warranting detailed analysis: air quality; noise; wastes, hazardous materials and stored fuel; water resources; floodplains; biological

resources; transportation; airspace/airfield operations and Bird-Aircraft Strike Hazards; safety and occupational health; and geology and soils.

1.5 APPLICABLE REGULATORY REQUIREMENTS

This environmental analysis has been conducted in accordance with the President's Council on Environmental Quality (CEQ) regulations, Title 40 of the Code of Federal Regulations (CFR) §§1500-1508, as they implement the requirements of the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. §4321, et seq., and Air Force Instruction (AFI) 32-7061 Environmental Impact Analysis Process, as promulgated in 32 CFR Part 989. These regulations require federal agencies to analyze the potential environmental impacts of proposed actions and alternatives and to use these analyses in making decisions on a proposed action. Cumulative effects of other ongoing activities also must be assessed in combination with the Proposed Action. The CEQ was instituted to oversee federal policy in this process. The CEQ regulations declare that an EA is required to accomplish the following objectives:

- Briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI);
- Aid in an agency's compliance with NEPA when an EIS is not necessary, and facilitate preparation of an EIS when necessary.

32 CFR 989 specifies the procedural requirements for the implementation of NEPA and preparation of the EA.

This EA identifies other environmental regulatory requirements relevant to the Proposed Action and alternative. Regulatory requirements under the following programs were assessed: Noise Control Act of 1972; Clean Air Act; Clean Water Act; National Historic Preservation Act; Endangered Species Act; Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA) of 1970; and Occupational Safety and Health Act. Requirements also include compliance with Executive Order (EO) 11988, Floodplain Management; EO 11990, Protection of Wetlands; Federal Coastal Zone Management Act; and EO 12898 and EO 13045 Environmental Justice.

1.6 COASTAL ZONE CONSISTENCY DETERMINATION

The Federal Coastal Zone Management Act (CZMA) creates a state-federal partnership to ensure the protection of coastal resources. The Federal CZMA requires each Federal agency activity within or outside the coastal zone, which affects any land or water use or natural resources of the coastal zone to be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of the Florida Coastal Management Program (CMP) of 1981. The Florida CZMA presumes that "direct Federal activities" will directly affect the coastal zone. According to the Florida CMP, "direct Federal activities" are those that "are conducted or supported by or on behalf of a federal agency in the exercise of its statutory responsibilities, including development projects."

The Federal CZMA requires Federal agencies carrying out activities subject to the Act to provide a "consistency determination" to the relevant state agency. The Federal regulations implementing the Act then require the state agency to inform the Federal agency of its agreement or disagreement with the Federal agency's consistency determination. Therefore, the Proposed Action and alternative analyzed in this EA require a consistency determination to be submitted by the US Air Force to the relevant Florida agency and a response from the State of Florida of either agreement or disagreement with that determination. The Air Force's Consistency Determination is contained in the Consistency Statement at **Appendix C**. This EA including the Air Force's Consistency Statement was submitted to Florida State Clearinghouse for a multi-agency review. The Florida Department of Community Affairs assembled and reviewed the comments provided by the various state and county agencies and determined that the proposed project is consistent with the Florida Coastal Management Program. Public notice and multi-agency coordination correspondence is included in **Appendix B**.

SECTION 2.0
DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 THE PROPOSED ACTION AND ALTERNATIVES

The following sections provide a description of the Proposed Action, the Alternatives to the Proposed Action and the No Action Alternative. The Proposed Action involves the construction of multiple roadway improvement projects, the construction of approximately 10,000 square-feet of additional parking lot and the relocation of an aircraft wash rack facility. Traffic congestion on MacDill AFB continues to be an issue as base functions and tenant organizations continue to expand. Although alternative transportation options are available, including vanpools, mass transit, and car pooling, the Draft Final MacDill AFB Transportation Study, (USAF, 2010a) shows that nearly 80 percent of the base population still commutes to work alone in their personal vehicles. This equates to nearly 15,000 vehicles entering and leaving the base daily, not including retirees, contractors, and other visitors to the Base.

2.1.1 Description of the Proposed Action

The Proposed Action would widen South Boundary Boulevard and provide improved traffic flow to existing exit routes, which should help commuters avoid driving past the USCENTCOM Complex, where pedestrians cross South Boundary Boulevard temporarily bringing traffic to a stop. The Proposed Action would include the construction of multiple roadway projects, which would improve, expand, and extend existing roadways to permit greater traffic flow and increase the inter-connection between Bayshore Boulevard, South Boundary Boulevard, and Great Egret Avenue. In general, all of the projects are aimed at addressing the following needs (1) improve traffic flow, (2) reduce congestion around the USCENTCOM Complex, (3) increase pedestrian safety, (4) alleviate parking shortages in the USCENTCOM Complex area and (5) improve AT/FP reaction time at the Base gates. Currently, the projects are programmed

as individual projects and are not proposed to be implemented at the same time; however, some overlap of project timelines may occur.

To meet the needs of routine base functions and expanding tenant activities at MacDill AFB, the proposed MRIPs include the following:

- SOCOM Memorial Drive Extension (project number NVZR100035) – would extend SOCOM Memorial Drive, and would remove the Tampa Point Boulevard/Bayshore Boulevard intersection. This project meets the need to improve traffic flow by maintaining a connection between the area north of SOCOM and Bayshore Boulevard and establish a more desirable intersection spacing on Bayshore Boulevard with the proposed Zemke Avenue extension in place.
- Zemke Avenue Extension (project number NVZR100033) – would extend Zemke Avenue and remove CENTCOM Avenue. This project meets the need to improve traffic flow by providing a more logical direct connection between South Boundary Boulevard and Bayshore Boulevard. This project also meets the need of improved AT/FP standards. It should be noted that the final alignment of the Zemke Avenue Extension may vary. However, any variance of final design would not be considered to be an alternative.
- South Boundary Boulevard Widening (project number NVZR100047) – involves widening South Boundary Boulevard. This project meets the need for balance between the inbound and outbound number of lanes and improved pedestrian safety in the SOCOM area.
- Great Egret Avenue Extension (project number NVZR100036) – would connect the east end of Great Egret Avenue to South Boundary Boulevard. This project meets the need for improved traffic flow by providing an additional route to the Bayshore Gate. This project would also reduce traffic on North Boundary Boulevard. It should be noted that the final alignment of the Great Egret Avenue

Extension may vary slightly. However, any variance of final design would not be considered an alternative.

- Other Potential Roadway Improvements – would make upgrades to Hangar Loop Drive by providing left turn lanes, widen Bayshore Boulevard to accommodate a four-lane section north of Tampa Point Boulevard and add turn lanes south of Tampa Point Boulevard, add traffic signals at the Bayshore/Florida Keys Avenue intersection, and improve/reconfigure the MacDill Gate. This project has not yet been assigned a project number. This project meets the need of improved capacity along Hangar Loop Drive and the need of improved traffic flow and capacity along Bayshore Boulevard.
- Relocation of Aircraft Wash Rack (project number NVZR100042) – would relocate the current aircraft wash rack in order to complete the extension of Great Egret Avenue. The need to balance overall traffic flow to existing Base entrances/exits would be met in part through this project.
- Parking Lot Construction (project number NVZR050254) – would create 10,000 square-feet of permanent parking lot. This project meets the need for additional parking in the USCENTCOM Complex area and supports the safety of pedestrians travelling to and from the USCENTCOM Complex.

2.1.2 Description of the Alternatives to the Proposed Action

It should be recognized that there are alternatives to the Proposed Action. These alternatives include variations on the final design of the Proposed Action. The following Alternatives to the Proposed Action were considered:

- Modifications to the alignment of Tampa Point Boulevard in lieu of closing the northern terminus of Tampa Point Boulevard at Bayshore Boulevard (project number NVZR100035). The alignment modification is based on recommendations outlined in the Draft Final MacDill AFB Transportation Study, (USAF, 2010a);

- Utilize the previous one-way roadway system between South Boundary Boulevard and Florida Keys Avenue to improve capacity along Hangar Loop Drive and Hillsborough Loop Drive in lieu of constructing left turn lanes along Hangar Loop Drive. This project is part of the Other Potential Roadway Improvements and has not yet been assigned a project number;
- One alternate relocation site for the existing aircraft wash rack facility (project number NVZR100042). This alternate location is located on pervious vacant land and would require utility infrastructure; and
- Three alternate sites for the proposed parking lot (project number NVZR050254).

Impacts to the environment resulting from these alternatives to the Proposed Action are also evaluated in this EA. It should be noted that impacts to the environment resulting from Alternatives to the Proposed Action are equal to or lesser than those of the Proposed Action.

2.1.3 Description of the No Action Alternative

Another alternative to the Proposed Action is the No Action Alternative. Under the No Action Alternative, the USAF would not construct any roadway improvement projects or additional permanent parking lot.

The following sections describe the Proposed Action, the Alternatives to the Proposed Action and the No Action Alternative in detail; how these options were developed, and the basis for selection of the Proposed Action.

The following sections specifically include:

- A list of the environmental constraints and other selection criteria that influence the location of the Proposed Action;
- A detailed description of the Proposed Action;
- A description of the alternative considered for implementation of the Proposed Action; and

- A matrix comparing the environmental effects of the Proposed Action and No Action Alternative.

2.2 SELECTION CRITERIA

The northwest quadrant of the Base has the highest traffic count and the most congestion and parking problems. The selection criteria for addressing these issues included the following:

- SOCOM Memorial Drive Extension (project number NVZR100035) – (1) Maintain a connection between the area north of SOCOM and Bayshore Boulevard; and (2) Establish a more desirable intersection spacing on Bayshore with the Zemke Avenue Extension in place.
- Zemke Avenue Extension (project number NVZR100033) – (1) Improve, AT/FP efforts by providing increased reaction time for 6th Security Force Squadron (6 SFS) personnel dispatching from the Bayshore Gate; (2) Allow for future Base roadway projects aimed at moving Bayshore Gate to the south, to help reduce wait times and queuing to the north on Bayshore Boulevard; and (3) Improve traffic flow by providing a more direct connection between South Boundary Boulevard and Bayshore Boulevard.
- South Boundary Boulevard Widening (project number NVZR100047) – (1) Provide for balance between the inbound and outbound number of lanes provided to the SOCOM area; and (2) Provide the opportunity to enhance the roadway network for bicyclists and pedestrians by incorporating specific facilities to serve these modes.
- Great Egret Avenue Extension (project number NVZR100036) – (1) Improve traffic flow by providing an additional on-base flow to the Bayshore Gate exit; (2) Reduce traffic on North Boundary Boulevard; and (3) Balance overall traffic flow to support additional new land uses in the immediate vicinity of the extension (i.e., additional USCENTCOM development or potential KCX bed down plan,-

which is the name of the AF program to procure the next-generation aerial refueler).

- Other Potential Roadway Improvements – (1) Improve the capacity along Hangar Loop Drive. (2) Improve traffic flow and capacity along Bayshore Boulevard; and (3) Reconfigure the MacDill Gate to provide additional capacity to meet AT/FP standards and address the anticipated future level-of-service operations for that movement.
- Relocation of Aircraft Wash Rack (project number NVZR100042) – (1) Provide an adequate facility and location for aircraft wash operations.
- Parking Lot Construction (project number NVZR050254) – (1) Provide an additional 10,000 square feet of permanent parking to alleviate parking shortages in the USCENTCOM Complex area; and/or (2) The location of the proposed parking lot should support the safety of pedestrians traveling to and from the USCENTCOM Complex.

The Proposed Action and Alternatives to the Proposed Action meet the selection criterion. The No Action Alternative would continue operation of existing roadways and does not address the traffic, parking deficiencies, or pedestrian safety improvements, and would not improve the current reaction time of 6 SFS personnel at MacDill AFB.

2.3 DETAILED DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action would construct multiple roadway projects, which would improve, expand, and extend existing roadways to permit greater traffic flow and increase the inter-connection between Bayshore Boulevard, South Boundary Boulevard, and Great Egret Avenue. The roadway improvements are being evaluated as a whole; however, for budgetary and construction purposes, each of the roadway improvements are considered to be separate projects. The Proposed Action would improve safety and traffic flow by reducing congestion around the USCENTCOM Complex where traffic slow-downs and

stoppages are common due to pedestrian traffic. The roadway improvement projects are being designed in FY10 and planned for implementation in FY11 through FY13. The MRIPs are programmed as individual projects and would most likely not be implemented at the same time. Each of the MRIPs is expected to take three to six months to construct. A brief description of each roadway project is provided below.

- SOCOM Memorial Drive Extension (project number NVZR100035) – would extend SOCOM Memorial Drive and create a direct connection between Hillsborough Loop Drive and South Bayshore Boulevard, just north of the existing Chevron Park housing area. This project would permit traffic to easily route over to Bayshore Boulevard and avoid traffic congestion around the USCENTCOM Complex. This project would also remove the existing intersection and traffic signals where Tampa Point Boulevard connects to Bayshore Boulevard. This project is expected to create approximately 9,600 square feet (sq ft) of new asphalt surface. This project is estimated to cost $500,000. A modification of this project is included as an alternative to the Proposed Action and is discussed further in Section 2.4.

- Zemke Avenue Extension (project number NVZR100033) – would extend Zemke Avenue. This project would construct a new roadway between the eastern end of Zemke Avenue and Bayshore Boulevard. The new roadway would run along the north side of an existing drainage canal. This project would also remove CENTCOM Avenue, located just north of Zemke Avenue eliminating the intersections at both ends of the road (at Bayshore Boulevard and South Boundary Road). The project would allow traffic from USCENTCOM to have direct access to Bayshore Boulevard. In addition, eliminating CENTCOM Avenue would improve AT/FP efforts by reducing reaction time for 6 SFS personnel at the Bayshore Gate. This project would remove an existing roadway and create a new road resulting in a net increase in impervious surface of approximately 6,000 sq ft. This project is estimated to cost $1,000,000.

- South Boundary Boulevard Widening (project number NVZR100047) – involves widening South Boundary Boulevard in the section between Building 552 and Zemke Avenue. This section of road is three lanes at the southern end but narrows to two lanes as it approaches CENTCOM Avenue. South Boundary Boulevard is currently the principle exit route for commuter traffic leaving the base through the MacDill Gate and Dale Mabry Gate. The project would add a second northbound traffic lane between Hangar Loop and Zemke Avenue to resolve traffic congestion problems. The project would involve the construction of a culvert extension to the existing culvert to cross a drainage canal. Significant, long-term impacts to wetlands are not anticipated to occur upon completion of the Proposed Action. Widening South Boundary Boulevard would create approximately 8,400 square feet of additional asphalt surface on base. This project is estimated to cost $1,000,000.
- Great Egret Avenue Extension (project number NVZR100036) – would connect the east end of Great Egret Avenue to South Boundary Boulevard just south of the intersection with Zemke Avenue. The project would involve construction of a culvert in a drainage canal to permit the roadway to cross the canal. Significant, long-term impacts to wetlands are not anticipated to occur upon completion of the Proposed Action. This roadway project would bisect the northern portion of the north flight apron and would also require relocation of the aircraft Wash Rack facility located at the north end of the flight apron. The relocation of the aircraft wash rack is evaluated as a separate construction project in this EA. This roadway project would create 24,000 square feet of additional asphalt surface. This project is estimated to cost $1,000,000.
- Other Potential Roadway Improvements – This project has not yet been assigned a project number. This project encompasses the following improvements: (1) Providing left turn lanes along Hangar Loop Drive; (2) Widening Bayshore Boulevard. The project would involve the construction of a culvert extension to

the existing culvert to cross a drainage canal, significant, long-term impacts to wetlands are not anticipated to occur upon completion of the Proposed Action. (3) Adding left and/or right turn lanes along Bayshore Boulevard south of Tampa Point Boulevard (or SOCOM Memorial Way Extension); and (4) Adding traffic signals at the Bayshore Boulevard/Florida Keys Avenue Intersection. The combined increased in impervious surface as a result of these projects is estimated to be 26,800 sq ft. These projects are estimated to cost $1,500,000. An alternate to improving capacity along Hangar Loop Drive is included as an alternative to the Proposed Action and is discussed further in Section 2.4

- Relocate Aircraft Wash Rack (project number NVZR100042) – in order to complete the Great Egret Avenue extension the aircraft wash rack is proposed for relocation on existing pavement. The proposed construction location is southwest of the existing wash rack. The new sanitary sewer, stormwater, and drinking water lines would connect to the sanitary sewer, stormwater, and drinking water lines at the existing wash rack. Since this project is located on existing pavement no new impervious surface would be created as a result of this project. This project is estimated to cost $740,000. An alternate location for the aircraft wash rack is included as an alternative to the Proposed Action and is discussed further in Section 2.4.

- Parking Lot Construction (project number NVZR050254) would create a 10,000 square-foot permanent parking lot complete with curbing, striping, and stormwater treatment/attenuation areas. The proposed location for construction of the new permanent parking lot is presently unpaved, unimproved vacant land, parallel to the northern section of Hangar Loop Drive, and currently functions as a temporary parking lot. Three alternate locations were considered for the permanent parking lot and are discussed further in Section 2.4. This project would create 10,000 square feet of additional asphalt surface. This project is expected to cost $500,000.

Safety precautions, such as construction fencing, would be employed during construction activities to ensure that the Proposed Action does not pose any adverse health or safety risks to children and/or residents.

Photographs of the proposed roadway improvement sites are included in **Appendix D**. Construction of the MRIPs would include provisions for non-impervious areas disturbed during roadway construction and demolition activities. These areas would be covered, at a minimum, with a clean layer of graded and grassed fill and would accommodate any net gain in impervious surface through the construction of associated stormwater treatment/attenuation areas. The construction of stormwater treatment/attenuation areas greatly reduces potential adverse impacts associated with occupancy and modification of floodplains. The construction of stormwater treatment/attenuation areas at the MRIP sites may impart an overall benefit in those areas, historically lacking stormwater treatment/attenuation of runoff from impervious surfaces.

2.4 DETAILED DESCRIPTION OF THE ALTERNATIVES TO THE PROPOSED ACTION

The alternatives to the Proposed Action include variations on the final design and include:

- The alternative to closing Tampa Point Boulevard at Bayshore Boulevard (project number NVZR100035) is to make a modification to the alignment of Tampa Point Boulevard in order to increase the distance between this intersection and the proposed Zemke Avenue Extension. If the roadway alignment was curved to the east immediately adjacent to the existing northbound right turn lane, the spacing between the Zemke Avenue and Tampa Point intersections could be increased to approximately 350-400 feet. Intersections spaced this closely could be made to operate efficiently with the proper optimized and coordinated signal timing plans. The modification to the alignment of Tampa Point Boulevard would result in a net increase of approximately 3,120 sq ft. of impervious surface.

- An alternative to improving capacity on Hangar Loop Drive and Hillsborough Loop Drive is to revert back to a one-way roadway system between South Boundary Boulevard and Florida Keys Avenue. Since this alternative would not include the construction of new roadways there would be no increase in impervious surface associated with this alternative.
- The alternative proposed location for the aircraft wash rack (project number NVZR100042) is located adjacent to the southwest corner of the ramp. This alternative proposed location would be constructed on pervious vacant land and would require the installation of an oil/water separator and associated utility lines The alternative proposed location of the aircraft wash rack would create approximately 36,870 square feet of impervious surface.
- The three alternative locations for the proposed permanent parking lot (project number NVZR050254) are currently unpaved, unimproved vacant land or currently function as temporary parking lots, west of the Chevron Park residential area and south of CENTCOM Avenue in the northeast portion of MacDill AFB. The alternative locations for the parking lot would create approximately 10,000 square feet of impervious surface.

2.5 DESCRIPTION OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, none of the MRIPs, or the permanent parking lot would be constructed, and the use of the existing roads would continue without alteration.

If this alternative is implemented, traffic congestion and pedestrian safety concerns in the area would not be addressed, adversely affecting the 6 AMW mission. Under this alternative, there would be no improvements to water resources because additional stormwater treatment/attenuation areas would not be constructed, and the current direct discharges to Hillsborough Bay would continue.

This alternative is not considered a viable alternative, as it does not address the traffic congestion, and/or parking deficiencies at MacDill AFB, or improve AT/FP reaction times. However, it is included as a basis for comparison as required under Federal law.

2.6 IDENTIFICATION OF THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

Notwithstanding the minor improvements to drainage if the Proposed Action were implemented, the environmentally preferred alternative is the No Action Alternative, as no new roadways would be constructed.

2.7 OTHER ACTIVITIES IN THE AREA

Routine maintenance and repair projects are an on-going occurrence at MacDill AFB. Additionally, construction of a multi-story USCENTCOM parking garage along Zemke Avenue is proposed for an area adjacent to a MRIP site. Construction activities at the new USCENTCOM HQ facility which is currently under construction may still be on-going when some of the roadway improvement projects begin. Demolition of the existing USCENTOM HQ facility (B540) may also occur during construction of the MRIPs.

2.8 COMPARISON OF THE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES

Table 2.8.1 is a summary of the potential environmental impacts of the Proposed Action, Alternatives to the Proposed Action, and the No Action Alternative.

Table 2.8.1 Comparison of Environmental Consequences

Environmental Resources	Proposed Action	Alternatives to the Proposed Action	No Action Alternative
Air Quality	Short-term - *Minor Adverse* Long-term - No Impact	Short-term - *Minor Adverse* Long-term - No Impact	Short-term - No Impact Long-term - No Impact
Noise	Short-term - *Minor Adverse* Long-term - *Minor Adverse*	Short-term - *Minor Adverse* Long-term - *Minor Adverse*	Short-term - No Impact Long-term - No Impact
Hazardous Materials/ Wastes/ Stored Fuels	Short-term - *Minor Adverse* Long-term - No Impact	Short-term - *Minor Adverse* Long-term - No Impact	Short-term - No Impact Long-term - No Impact
Water Resources	Short-term - *Minor Adverse* Long-term - *Minor Beneficial*	Short-term - *Minor Adverse* Long-term - *Minor Beneficial*	Short-term - No Impact Long-term - No Impact
Floodplains	Short-term - *Minor Adverse* Long-term - *Minor Adverse*	Short-term - *Minor Adverse* Long-term - *Minor Adverse*	Short-term - No Impact Long-term - No Impact
Biological Resources	Short-term - *Minor Adverse* Long-term - No Impact	Short-term - *Minor Adverse* Long-term - No Impact	Short-term - No Impact Long-term - No Impact
Transportation	Short-term - *Minor Adverse* Long-term – *Minor Beneficial*	Short-term - *Minor Adverse* Long-term – *Minor Beneficial*	Short-term – *Minor Adverse* Long-term – *Minor Adverse*
Safety and Occupational Health	Short-term - No Impact Long-term - No Impact	Short-term - No Impact Long-term - No Impact	Short-term - No Impact Long-term - No Impact
Geology and Soils	Short-term - *Minor Adverse* Long-term - No Impact	Short-term - *Minor Adverse* Long-term - No Impact	Short-term - No Impact Long-term - No Impact
Indirect and Cumulative Impacts	Short-term - No Impact Long-term - No Impact	Short-term - No Impact Long-term - No Impact	Short-term - No Impact Long-term - No Impact

SECTION 3.0
AFFECTED ENVIRONMENT

This section describes the characteristics of the existing natural and man-made environment that could be affected by the Proposed Action and No Action Alternative. A summary of the overall mission objectives of MacDill AFB is also provided. This section establishes the basis for assessing impacts of the alternatives on the affected environment provided in Section 4.0.

The Base has an active runway (04-22) and an inactive runway that is used as a taxiway. MacDill AFB airfield facilities provide the capability to accommodate any aircraft in service with the United States government. The Base contains more than 500 buildings, including administrative and support facilities, a hospital and dental clinic, military housing, and recreation areas.

The area has a humid, subtropical climate characterized by long, hot summers and short, mild winters. The average annual temperature is approximately 73 degrees Fahrenheit (°F) with average minimum and maximum temperatures being approximately 63°F and 82°F, respectively. The rainy season generally occurs from May through September, with the dry season occurring during late fall and winter. Annual rainfall averages approximately 44.77 inches, according to the Intellicast website, (http://www.intellicast.com/Local/History.aspx?location=USFL0481).

3.1 AIR QUALITY

3.1.1 Air Pollutants and Regulations

The Clean Air Act (CAA) of 1970 directed the U. S. Environmental Protection Agency (USEPA) to develop, implement, and enforce strong environmental regulations that would ensure cleaner air for all Americans. In order to protect public health and welfare, the USEPA developed concentration-based standards called National Ambient Air Quality Standards (NAAQS). The USEPA established both primary and secondary NAAQS under the provisions of the CAA. Primary standards define levels of air quality necessary to protect public health with an adequate margin of safety. Secondary standards define air quality levels necessary to protect public welfare (i.e., soils, vegetation, property, and wildlife) from any known or anticipated adverse effects. NAAQS currently are established for six air pollutants (known as criteria air pollutants)

including carbon monoxide (CO), nitrogen oxides (NO_x), ozone (O_3), sulfur oxides (SO_x), measured as sulfur dioxide [SO_2]), lead (Pb), and particulate matter. Particulate matter standards incorporate two particulate classes: (1) particulate matter with an aerodynamic diameter less than or equal to 10 micrometers [PM_{10}]; and (2) particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers [$PM_{2.5}$].

The CAA does not make the NAAQS directly enforceable; however, the CAA does require each state to promulgate a State Implementation Plan (SIP) that provides for implementation, maintenance, and enforcement of the NAAQS in each air quality control region (AQCR) in the state. Title I of the CAA requires that all Federal facilities conform to the provisions of the SIP. The CAA Amendments of 1990 are currently the comprehensive Federal legislation regulating the prevention and control of air pollution. Title I of the CAA requires Federal actions to conform to the provisions of the approved SIP, which is developed and maintained by the Florida Department of Environmental Protection (FDEP) under Chapter 62 of the Florida Administrative Code (FAC). Title V of the CAA requires identification and characterization of emissions from all minor sources, including aircraft maintenance facilities, fuel storage tanks, and emissions from aircraft and motor vehicles.

The USEPA classifies the air quality within an AQCR according to whether or not the concentration of criteria air pollutants in the atmosphere exceeds primary or secondary NAAQS. All areas within each AQCR are assigned a designation of attainment, nonattainment, maintenance, unclassifiable attainment, or not designated attainment for each criteria air pollutant. An attainment designation indicates that the air quality within an area is as good as or better than the NAAQS. Nonattainment indicates that air quality within a specific geographical area exceeds applicable NAAQS. Maintenance indicates that an area was previously designated nonattainment but is now attainment. Unclassifiable and not designated indicate that the air quality cannot be or has not been classified on the basis of available information as meeting or not meeting the NAAQS. As defined in the Clean Air Act, areas designated as unclassifiable or not designated are treated as attainment.

As promulgated in Section 62-204.240 of the FAC, the State of Florida has adopted standards equal to or more restrictive than the NAAQS, as in the case of SO_2. The standards, listed in **Table 3.1.1** are reported in parts per million (ppm) or milligram per cubic meter (mg/m^3).

Table 3.1.1 National and State Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards		Florida Standards
	Level	Averaging Time	Level	Averaging Time	
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour [(1)]	None		9 ppm (10 mg/m^3)
	35 ppm (40 mg/m^3)	1-hour [(1)]			35 ppm (40 mg/m^3)
Lead	0.15 $\mu g/m^3$ [(2)]	Rolling 3-Month Average	Same as Primary		None
	1.5 $\mu g/m^3$	Quarterly Average	Same as Primary		1.5 $\mu g/m^3$
Nitrogen Dioxide	53 ppb [(3)]	Annual (Arithmetic Average)	Same as Primary		0.05 ppm
	100 ppb	1-hour [(4)]	None		None
Particulate Matter (PM_{10})	150 $\mu g/m^3$	24-hour [(5)]	Same as Primary		150 $\mu g/m^3$ 50 $\mu g/m^3$ - Annual (Arithmetic Average)
Particulate Matter ($PM_{2.5}$)	15.0 $\mu g/m^3$	Annual [(6)] (Arithmetic Average)	Same as Primary		
	35 $\mu g/m^3$	24-hour [(7)]	Same as Primary		
Ozone	0.075 ppm (2008 std)	8-hour [(8)]	Same as Primary		
	0.08 ppm (1997 std)	8-hour [(9)]	Same as Primary		
	0.12 ppm	1-hour [(10)]	Same as Primary		0.12 ppm
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour [(1)]	0.02 ppm 0.5 ppm – 3-hour
	0.14 ppm	24-hour [(1)]			0.1 ppm
	75 ppb [(11)]	1-hour	None		None

ppm- parts per million

(1) Not to be exceeded more than once per year.

(2) Final rule signed October 15, 2008.

(3) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard

(4) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).

(5) Not to be exceeded more than once per year on average over 3 years.

(6) To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.

(7) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).

(8) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)

(9) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008).

(10) (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.

(11) (a) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

The General Conformity Rule requires that any Federal action meet the requirements of a SIP or Federal Implementation Plan. More specifically, CAA conformity is ensured when a Federal action does not result in the following: cause a new violation of the NAAQS, contribute to an increase in the frequency or severity of violations of NAAQS, or delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS.

The General Conformity Rule applies only to actions in nonattainment or maintenance areas and considers both direct and indirect emissions. The rule applies only to Federal actions that are considered "regionally significant" or where the total emissions from the action meet or exceed the *de minimis* thresholds presented in 40 CFR 93.153. An action is regionally significant when the total nonattainment pollutant emissions exceed 10 percent of the AQCR's total emissions inventory for that nonattainment pollutant. If a Federal action does not meet or exceed the *de minimis* thresholds and is not considered regionally significant, then a full Conformity Determination is not required.

MacDill AFB is located in Hillsborough County within the West Central Florida Intrastate Air Quality Control Region (AQCR), as defined in 40 CFR 81.96. The Environmental Protection Commission (EPC) of Hillsborough County has received full air permitted delegation from the State. This allows the EPC, exclusively, to conduct permitting determinations, process applications, and issue air pollution permits for most facilities. According to 40 CFR 81.310, Hillsborough County is in attainment or unclassifiable for all criteria pollutants; therefore, the Conformity Rule does not apply to MacDill AFB.

Title V of the CAA requires state and local agencies to permit major stationary sources. A major stationary source is a facility (i.e., plant, base, or activity) that can emit more than 100 tons per year (tpy) of any one criteria air pollutant, 10 tpy of a hazardous air pollutant, or 25 tpy of any combination of hazardous air pollutants. However, lower pollutant-specific "major source" permitting thresholds apply in nonattainment areas. For example, the Title V permitting threshold for an "extreme" O_3 nonattainment area is 10 tpy of potential Volatile Organic Compound (VOC) or NO_x emissions. The purpose of the permitting rule is to establish regulatory control over large, industrial-type activities and monitor their impact on air quality.

Federal Prevention of Significant Deterioration (PSD) regulations also define air pollutant emissions from proposed major stationary sources or modifications to be "significant" if (1) a proposed project is within 10 kilometers of any Class I area, and (2) regulated pollutant emissions would cause an increase in the 24-hour average concentration of any regulated pollutant in the Class I area of 1.0 micrograms per cubic meter ($\mu g/m^3$) or more (40 CFR 52.21(b)(23)(iii)). PSD regulations also define ambient air increments, limiting the allowable increases to any area's baseline air contaminant concentrations, based on the area's designation as Class I, II, or III (40 CFR 52.21(c)). MacDill AFB is not within 10 kilometers of a Class I area; therefore, the PSD regulations do not apply.

3.1.2 Baseline Air Emissions

An air emissions inventory is an estimate of total mass emission of pollutants generated from a source or sources over a period of time, typically a year. The quantities of air pollutants are generally measured in pounds per year or tons per year. Emission sources may be categorized as point, area, or mobile emission sources. Point sources are stationary sources which can be identified by name and operated at a fixed location. Area sources are stationary sources of emissions too small to track individually, such as gas stations, small office buildings, or open burning associated with agriculture, forest management, and land clearing activities. Mobile sources are vehicles or equipment with gasoline or diesel engines, e.g., an airplane or a ship. Mobile sources are divided into two types, on-road and non-road. On-road mobile sources are vehicles such as cars, light trucks, heavy trucks, buses, engines, and motorcycles. Non-road sources are aircraft, locomotives, diesel and gasoline boats and ships, personal watercraft, lawn

and garden equipment, agricultural and construction equipment, and recreational vehicles. Accurate air emissions inventories are needed for estimating the relationship between emissions sources and air quality. The most recent (2002) emission inventory data from the USEPA AirData web site (http://www.epa.gov/air/data/geosel.html) for Hillsborough County, which includes MacDill AFB (USEPA, 2002) are provided in **Table 3.1.2** and include point, area, and mobile data.

Table 3.1.2 Stationary Air Emissions Inventory, Hillsborough County, Florida

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	SO_X (tpy)	NO_X (tpy)	PM_{10} (tpy)[3]	$PM_{2.5}$ (tpy)
Point Sources	2,899	56,390	7,434	5,318	65,294	5,318
Area Sources	3,619	1,801	14,944	1,904	596	1,904
Stationary Total	**6,517**	**58,191**	**22,379**	**7,221**	**65,890**	**7,221**
On-road Mobile	228,413	25,546	706	506	1,283	506
Non-road Mobile	94,881	21,593	1,291	1,243	2,597	1,243
Mobile Total	**323,294**	**47,139**	**1,997**	**1,749**	**3,880**	**1,749**
Grand Total	**329,811**	**105,330**	**24,376**	**8,970**	**69,770**	**8,970**

Source: Hillsborough County data summarized from USEPA's Air Data for 2002 (http://www.epa.gov/air/data/index. html)

Radon gas. The level at which the USEPA recommends consideration of radon mitigation measures is 4 picocuries per liter (pCi/L). According to a sampling report obtained from 6 AMDS/SGPB, radon is not considered a concern at MacDill AFB (USAF, 1987). All samples analyzed were below the USEPA target levels of 4 pCi/L.

3.2 NOISE

The meaning of noise for this analysis is undesirable sound that interferes with speech communication and hearing, or is otherwise annoying (unwanted sound). Under certain conditions, noise may cause hearing loss, interfere with human activities at home and work, and may affect people's health and well-being in various ways. Community noise levels usually change continuously during the day, and exhibit a daily, weekly, and yearly pattern.

The day-night average sound level (DNL) developed to evaluate the total daily community noise environment applies here. In June 1980, the Federal Interagency Committee on Urban Noise

published guidelines (FICUN 1980) relating DNL values to compatible land uses. This committee was composed of representatives from the U.S. Departments of Defense, Transportation, and Housing and Urban Development; the USEPA; and the Veterans Administration. Since their issuance, Federal agencies have generally adopted their guidelines for noise analysis. Most agencies have identified 65 decibels (dB) DNL as a criterion that protects those most affected by noise and that can often be achieved on a practical basis. Base activities that have the highest potential source of noise impacts are the aircraft/airspace operations. The Air Installation Compatible Use Zone (AICUZ) Study (2008) plotted the day-night average sound level (DNL) from 65 to 80 dB for a representative day at MacDill (**Figure 3-1**). The DNL contours reflect the aircraft operations at MacDill AFB. The DNL 65 dB contour covers the main runway, and extends about one mile southwest over Tampa Bay, and about 1½ miles northeast over Hillsborough Bay. The Proposed Action would occur outside the 65 dB contour.

Figure 3-1 – Noise Contours for a Representative Day at MacDill AFB

3.3 HAZARDOUS MATERIALS, WASTES, AND STORED FUEL

3.3.1 Hazardous Materials

Approximately 168 work centers base-wide use hazardous materials. Hazardous materials on-base include various organic solvents, chlorine, freon, paints, thinners, oils, lubricants, compressed gases, pesticides, herbicides, nitrates, and chromates. A detailed tracking and accounting system is in place to identify potentially hazardous materials and to ensure that Base organizations are approved to use specific hazardous materials. The Base complies with Air Force guidelines to identify and eliminate the use of ozone-depleting chemicals.

3.3.2 Wastes

There are two classifications of wastes generated at MacDill AFB: nonhazardous solid waste and hazardous waste. Nearly 80 percent of the solid waste generated from various residential and industrial sources is incinerated as an energy source at the City of Tampa incineration facility off base. The remainder is disposed at Hillsborough County landfill facilities. Curbside recycling is available in Military Family Housing areas and cardboard, paper, and aluminum recycling is conducted throughout the Base.

Hazardous wastes generated at MacDill AFB include solvents, fuels, lubricants, stripping materials, used oils, waste paint-related materials, and other miscellaneous wastes. The responsibility for managing hazardous waste lies with the generating organization and 6 CES/CEV. Wastes come from approximately 41 locations throughout the Base and are managed at satellite accumulation points base-wide. Satellite accumulation points are located at or near the points of hazardous waste generation and are operated in accordance with Federal, Florida, and Air Force regulations and guidelines. The former hazardous waste storage facility at Building 1115 is now in closure status under RCRA and is currently designated as a 90-day accumulation point. At a 90-day accumulation point hazardous waste can be accumulated for less than 90 days before it is sent off to a transportation storage and disposal facility (TSDF). The Defense Reutilization and Marketing Office (DRMO) is responsible for the sale, reclamation, or disposal of hazardous materials and wastes generated at MacDill AFB.

Outside contractors periodically collect used oil, which is accumulated at sites around the Base, for recycling. Outside contractors also collect waste antifreeze, tires, batteries, and fluorescent bulbs for recycling. These types of wastes, while requiring special handling procedures, are not hazardous waste.

3.3.3 Environmental Restoration Program

The Environmental Restoration Program (ERP), formerly known as the Installation Restoration Program, is a subcomponent of the Defense ERP that became law under the Superfund Amendments and Reauthorization Act (SARA). The ERP requires each DOD installation to identify, investigate, and clean up hazardous waste disposal or release sites. MacDill AFB began its ERP in 1981 with 38 sites originally identified. This consisted of a Phase I Records Search to identify potential sites of concern, which warranted further investigation. In accordance with USAF policy, all ERP sites at the base are addressed in a manner consistent with the CERCLA or RCRA process. Restoration projects on MacDill AFB are conducted under two regulatory programs: those governing petroleum releases from underground storage tanks (USTs), and those governing cleanup of Solid Waste Management Units (SWMUs) in accordance with the installation's RCRA permit. There are 49 SWMUs and ERP sites scattered throughout the installation. Of the 49 SWMUs and ERP sites, 21 are No Further Action (NFA), one is pending NFA, and 27 are Remedy in Place (RIP). None of these sites have been identified on the National Priorities List under CERCLA. Plans for future development in the areas of any of the ERP sites should take into consideration the possible restrictions and constraints that they represent. The FDEP regulates cleanup activities at petroleum sites, and has entered into a Petroleum Contamination Agreement with MacDill AFB. The investigation and cleanup of SWMUs is conducted in accordance with the Hazardous and Solid Waste Amendments (HSWA) permit issued to the base under USEPA ID No. FL6 570 024 582. **Figure 3-2** depicts the MacDill AFB constraints, including the ERP sites.

Figure 3-2 –MacDill AFB Environmental Constraints Map

3.3.4 Sanitary Wastewater Treatment

MacDill AFB owns and operates its sanitary sewer system consisting of sewer lines, lift stations, and a wastewater treatment plant (WWTP). The WWTP is in the southeastern corner of the base on Bayshore Drive. The WWTP is permitted to treat 1.2 million gallons per day (mgd) with a design that will provide for two mgd. Current operations are at 400,000 gallons per day that treat mainly domestic wastewater. The tertiary treatment process uses activated sludge, clarifiers, sand filtration, and disinfection before it is discharged into a holding pond adjacent to the WWTP. The two golf courses at the Bay Palms Golf Complex on Base use most of the discharge for irrigation purposes. During dry periods there is not adequate discharge to irrigate the courses and during wet times the surplus water is sent to one irrigation field near Golf Course Avenue and Marina Bay Drive. A 20-million-gallon percolation pond located just northwest of the intersection of Marina Bay Drive and Southshore Avenue. The WWTP service area does not completely encompass the Base; therefore, MacDill AFB uses on-site septic systems for

wastewater treatment and disposal for primarily the western portion of the base and the gates. MacDill AFB currently has 16 septic systems.

3.3.5 Stored Fuel

The Base receives jet fuel (JP-8) at the Defense Fuel Supply Point (DFSP) by pipeline from Port Tampa, while commercial tank trucks deliver other fuels to the Base. JP-8 storage capacity at DFSP and MacDill AFB is over 9.6 million gallons. The JP-8 storage consists of four large, aboveground, floating-roof tanks at DFSP (total capacity 6.9 million gallons), two large aboveground storage tanks (ASTs) for the flightline fueling system (total capacity 2.7 million gallons), and several miles of underground and aboveground pipeline. Diesel, gasoline, and heating oil are also stored throughout MacDill AFB in small to medium-sized USTs and ASTs ranging in size from 50 to 25,000 gallons.

3.4 WATER RESOURCES

3.4.1 Surface Water

Surface water flows at the Base are primarily from stormwater runoff. Topographic maps show that the entire Base is an independent drainage area with no natural surface waters entering or leaving the site prior to final discharge into Tampa Bay. Most of the Base drains toward the southern tip of the Interbay Peninsula; however, the easternmost section of the Base drains toward Hillsborough Bay.

About 25 percent of the Base surface cover is impervious. The soil type is predominantly poorly drained fine sands. The drainage system consists of piping and surface ditches. Man-made ponds exist primarily on the southeast portion of the Base. In the southern portion of the Base there is a poorly drained area that includes two creeks, Raccoon Hammock Creek and Broad Creek. This area is subject to shallow flooding by the highest of normal tides.

The USEPA has issued a National Pollutant Discharge Elimination System (NPDES) multi-sector stormwater general permit (No. FLR05E128) in April 2006 and a multi-sector general NPDES permit (No. FLR04E059) to MacDill AFB in March 2008. These permits authorizes the discharge of stormwater associated with industrial activity and non-industrial stormwater

discharges, respectively. Areas of potential runoff contamination at the Base are the runways and the airfield aprons.

To control for discharges of floating pollutants resulting from accidental spills, the Base maintains a number of boom-type containment systems and absorbents across stormwater channels. The Base also maintains a Spill Prevention Control and Countermeasures (SPCC) Plan to satisfy 40 CFR 112. Per the same regulation, the base maintains a Facility Response Plan given the location of the Base adjacent to navigable waters and shorelines, as well as the amount of fuel storage capacity existing on site.

3.4.2 Groundwater

There are two aquifer systems underlying MacDill AFB, the surficial aquifer and the Floridan Aquifer. The surficial aquifer system, which consists generally of sand, clayey sand, and shell, is unconfined and is approximately 20 feet thick; however, the surficial aquifer is not used for water supply at MacDill AFB. In residential areas beyond the Base boundaries, small-diameter wells are installed in the surficial aquifer to supply small irrigation systems. The Floridan Aquifer underlies the surficial aquifer and is separated from it by a clay confining layer. The Floridan Aquifer is a major source of groundwater in the region, but is not used for water supply at MacDill AFB. The City of Tampa supplies potable water to MacDill AFB, which obtains drinking water from surface water sources and through purchases from Tampa Bay Water (TBW). The purchased water is obtained from TBW's Aquifer Storage and Recovery (ASR) system, groundwater, surface water, and desalinated seawater supplies. There are no potable water supply wells located on MacDill AFB.

The water table in the surficial aquifer is shallow and ranges from land surface near Tampa Bay and tidal creeks to approximately five feet below land surface at inland locations. Groundwater levels and flow directions generally are determined by low gradients and are tidally influenced by ditches and canals and by Hillsborough and Tampa Bays. The direction of groundwater flow in the surficial aquifer is generally radial from the north-central portion of the Base towards the coastline. Groundwater mounding or a localized elevation of the water table above natural levels

has been shown to occur in the golf course area where reclaimed water from the on-base wastewater treatment plant is applied by spray irrigation.

Groundwater quality has been affected by past and present Base activities. Elevated volatile organic compound concentrations have been found in surficial aquifer groundwater at various sites that contain or contained petroleum storage tanks. Elevated metals concentrations have been found in areas of former landfills. Elevated nitrate, nitrite, and pesticide concentrations have been identified in golf course areas.

3.5 FLOODPLAINS

According to information provided by the Federal Emergency Management Agency (FEMA Maps dated 2008), 80 percent (4,510 acres) of the Base is within the 100-year floodplain. **Figure 3-3** indicates that the residential, industrial, and institutional land uses on the Base are within the 100-year floodplain, along with most of the commercial and aviation support areas. Furthermore, the runway and airfield occupy approximately 80 percent of land mass outside the floodplain on MacDill AFB and is constrained from being developed for safety reasons (clear zones, noise constraints). Drainage ditches, culvert, roads and sidewalks occupy another 17 percent. Therefore, less than 3 percent are outside the 100-year floodplain and are suitable for development.

Executive Order (E.O.) 11988, *Floodplains Management*, requires Federal agencies to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains. Federal agencies are required to evaluate the potential effects of any actions it takes in the floodplain to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplains management. When an action is proposed for location in the floodplain, the Air Force is required to consider alternatives to avoid adverse effects and incompatible development in the floodplain. When the only practicable alternative consistent with the law and with the policy set forth in the E.O. requires siting in the floodplain, the project must be designed or modified to minimize the potential harm to the floodplain. Finally, the agency is

required to provide public notice and an opportunity for public comment prior to proceeding with any action in the floodplain.

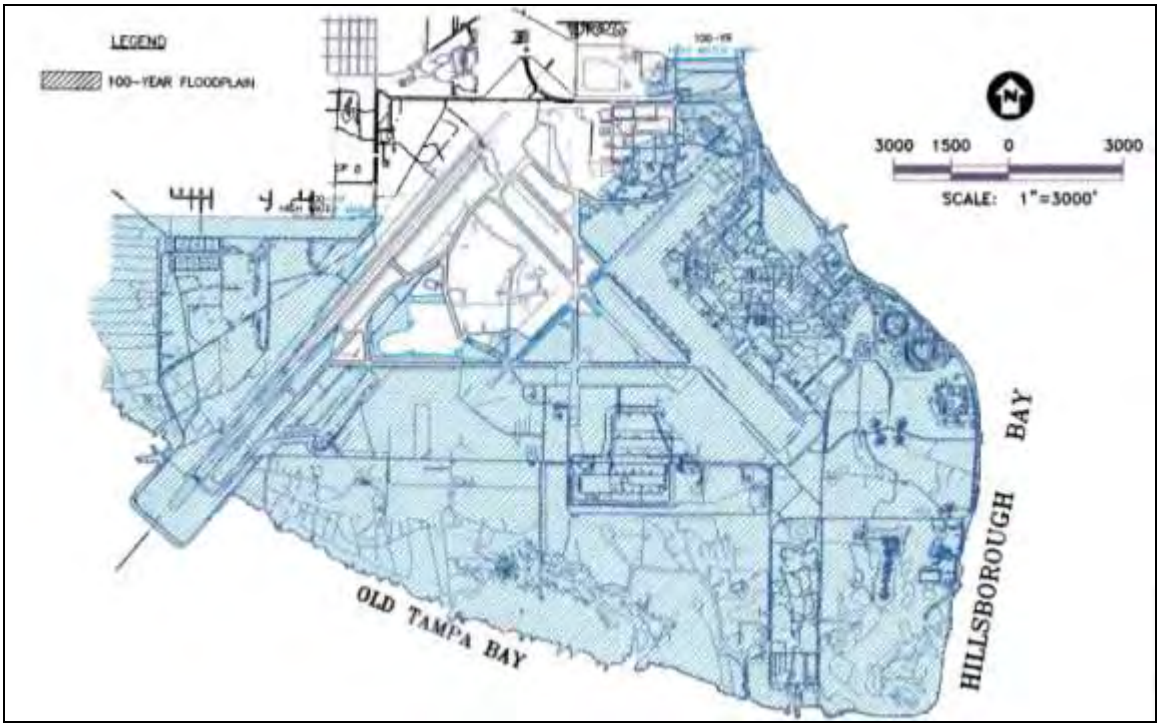

Figure 3-3 – Location of 100-year Floodplain on MacDill AFB.

3.6 BIOLOGICAL RESOURCES

3.6.1 Vegetative Communities

Land use on MacDill AFB is designated as either: airfield, urban, industrial, light industrial, commercial institutional (educational and medical) residential, recreational or improved vacant land. The improved vacant land includes cleared open fields, grassed areas, treated wastewater spray fields, and the golf course. The developed and semi-developed areas on the Base comprise approximately 3,500 acres of the 5,630-acre Base. The undeveloped areas within the Base boundaries have experienced some degree of disturbance, such as ditching, clearing, or the encroachment of exotic vegetation. The unimproved vegetative communities include forested uplands and shrub-scrub wetlands. The Proposed Action is located in the heavily developed area of the Base amongst numerous other facilities and structures.

3.6.2 Wetlands

The 1998 Wetland Delineation Study identified, delineated, and classified approximately 1,195 acres of wetlands on MacDill AFB (USAF, 1998). Wetland systems included palustrine wetlands (315 acres) and scrub/shrub wetlands (880 acres). Mangrove wetlands are the principal scrub/shrub wetland community on the Base. Black mangrove (*Avicennia germinans*) and white mangrove (*Laguncularia racemosa*) are the dominant species. Red mangrove (*Rhizophora mangle*) is also present at the waterward fringes of the community. The mangroves have been negatively impacted by historic dredge and fill activities and the excavation of mosquito ditches. However, despite these impacts, this community provides valuable wildlife habitat and is protected by state and local regulations.

A jurisdictional wetland survey performed by an US Army Corps of Engineers (USCOE) certified wetland delineator indicated the locations of Waters of the United States and vegetated wetlands at MacDill AFB (USAF, 1998). Even though the survey is over twelve years old, it still serves as a useful planning and habitat management tool. The only wetlands in the vicinity of the Proposed Action are two drainage canals which transect Zemke Avenue and South Boundary Boulevard on the southern side of the USCENTCOM Complex and Bayshore Boulevard west of the USCENTCOM Complex (USAF, 1998). Construction of a box culvert

and extension of an existing box culvert within the northern canal is associated with the Great Egret Avenue extension project and Bayshore Boulevard widening project, respectively. Extension of an existing box culvert within the southern canal is associated with the South Boundary Boulevard widening project. The northern canal is a narrow northeast/southwest drainage canal that runs between the USCENTCOM compound and the Naval Forces Central Command/Marine Corps Central Command (NAVCENT/MARCENT) compound is classified as an estuarine scrub/shrub emergent wetland. The southern canal is also a northeast/southwest drainage canal located just south of Zemke Avenue, which begins at a stormwater outfall near the aircraft washrack. This canal is also classified as an estuarine scrub/shrub emergent wetland. Both of these tidally influenced drainage canals directly connect to Hillsborough Bay approximately 500 feet east and southeast of the USCENTCOM Complex. The drainage canals are approximately 15 feet wide and roughly eight feet deep. There is little vegetation on the canal banks other than grass near the proposed crossing of Great Egret Avenue. Scattered cattails can be found in the canal bottoms.

3.6.3 Wildlife

Representatives from the Florida Fish and Wildlife Conservation Commission (formerly the Florida Game and Freshwater Fish Commission), National Audubon Society, and the Tampa Bay Sanctuaries completed an evaluation of the wildlife habitat on MacDill AFB in 1992 (Paul, 1992). These surveys determined that the habitat quality ranged from poor to excellent, with the upland forested communities considered poor and the mangrove wetlands considered excellent. The upland forested habitat has been degraded for native fauna due to the suppression of the natural fire cycle, the fragmentation of the habitat, and the invasion of exotic vegetation. The mangrove wetland habitat has been degraded somewhat by the excavation of mosquito ditches and the deposition of spoil within the wetlands. However, the large contiguous habitat area that the mangroves provide and the relative inaccessibility to humans have increased the habitat value.

The surveys also included an evaluation of the wildlife species present and potentially present on the Base. The species observed during the surveys included one reptile, 10 mammals, and 79

birds. Based on the types of habitat available, the survey concluded that 20 reptiles, 17 mammals, and 155 birds might occur within the boundaries of the Base.

3.6.4 Endangered, Threatened, and Special Concern Species

Wildlife species listed by federal or state agencies as endangered, threatened, or of special concern and known to occur permanently or periodically, or have the potential to occur on the Base are shown in **Table 3.6.1**. The majority of the listed species is associated with the mangrove community and includes shore birds, wading birds, and raptors. These species use the mangrove community primarily for foraging and nesting.

The forested upland communities provide habitat for several state and federally listed species. The southeastern American kestrel, the burrowing owl, and gopher tortoise have been observed within this community on the Base. Other listed species that may occur in this habitat include gopher frog, Florida pine snake, short-tailed snake, Bachman's warbler, and Florida mouse. Two bald eagle nests are located on MacDill AFB; however, both are located a significant distance south of the proposed work site. A pair of bald eagles has repeatedly nested on MacDill AFB for the past several years. Over the last 10 years the eagles have occupied three different nest locations, the first nest was abandoned around 1998 in favor of a new location closer to the South Ramp. The new nest tree location was blown over a few years later during tropical storm Gabriel in September 2001. In 2003, the eagles constructed a new nest in a longleaf pine tree in the middle of the Munitions Storage Area. Although the tree has since succumb to pine beetles, the dead tree is still standing and the nest continues to be occupied during the breeding season. A 660-foot "clear zone" has been established around the nest site.

In 1996, the *Biological Survey of MacDill AFB* and the *Endangered Species Management Plan MacDill AFB* identified the general locations of protected species at MacDill AFB (USAF, 1996a and 1996b). In 2005, MacDill AFB completed an updated Endangered Species Population Survey (USAF, 2005). Neither survey identified nesting sites or other species habitat for protected species at or near the MRIP sites.

Table 3.6.1 Summary of Protected Species Identified at MacDill AFB

Common name	Scientific Name	Status	
		Federal	State
Reptile/Amphibians			
American alligator	*Alligator mississippiensis*	T (SA)	SSC
Atlantic loggerhead turtle	*Caretta caretta caretta*	T	T
Atlantic green turtle	*Chelonia mydas mydas*	E	E
Gopher tortoise	*Gopherus polyphemus*	-	T
Gopher frog	*Rana capito*	C2	SSC
Florida pine snake	*Pituophis melanoleucus mugitus*	C2	SSC
Short-tailed snake	*Stilosoma extenuatum*	C2	T
Birds			
Roseate spoonbill	*Ajaia ajaja*	-	SSC
Limpkin	*Aramus guarauna*	-	SSC
Burrowing owl	*Athene cunicularia*	-	SSC
Piping plover	*Charadrius melodus*	T	T
Southeastern snowy plover	*Charadrius alexandrinus tenuirostris*	C2	T
Little blue heron	*Egretta caerulea*	C2	SSC
Reddish egret	*Egretta rufescens*	C2	SSC
Snowy egret	*Egretts thula*	-	SSC
Tricolored heron	*Egretta tricolor*	-	SSC
Peregrine falcon	*Falco peregrinus tundris*	T	E
Southeast American kestrel	*Falco sparverius paulus*	C2	E
Florida sandhill crane	*Grus canadensis pratensis*	-	T
American oystercatcher	*Haematopus palliatus*	-	SSC
Bald eagle	*Haliaeetus leucocephalus*	T	T
Wood stork	*Mycteria americana*	E	E
Brown pelican	*Pelecanus occidentalis*	-	SSC
Least tern	*Sterna antillarum*	-	T
Roseate tern	*Sterna dougalii*	T	T
Bachman's warbler	*Vermivora bachmanii*	E	E
Black skimmer	*Rynchops niger*	-	SSC
White ibis	*Eudocimus albus*	-	SSC
Mammals			
Florida mouse	*Podomys floridanus*	C2	SSC
West Indian (FL) manatee	*Trichechus manatus*	E	E
Fish			
No State or Federally listed fish species are known to exist on Base		-	-
Plants			
No State or Federally listed plant species are known to exist on Base		-	-

T=Threatened, T(SA)=Threatened/Similarity of Appearance, E= Endangered, SSC= Species of Special Concern, C2=Candidate for listing

Source: Endangered Species Management Plan, MacDill AFB, Florida (USAF, 1996b)

3.7 TRANSPORTATION

MacDill AFB is served by four operating gates on the north side of the base: Dale Mabry Highway, Bayshore Boulevard, MacDill Avenue, and Tanker Way. The Dale Mabry, Bayshore, and MacDill gates are used for government and personal vehicles (commuter traffic). The large vehicle (contractor trucks, delivery vehicles, and recreational vehicles) entry point is the Tanker Way gate. Large vehicles are inspected, and their credentials and destinations are confirmed before entering the base.

Sections of Bayshore Boulevard near Gandy Boulevard and sections of Gandy Boulevard west of Dale Mabry currently operate at congested levels of service. The transportation system on Base consists of arterials, collectors, and local streets that connect with the off-base network through the four gates. On-base arterial facilities include North and South Boundary Boulevard, Bayshore Boulevard, Marina Bay Drive, and Tampa Point Boulevard. Implementing the proposed roadway improvement projects would widen South Boundary Boulevard. The current traffic study (USAF, 2010a) determined that modification to intersections along South Boundary Boulevard, Tampa Point Boulevard, and Marina Bay Drive would increase flow and safety.

Approximately 15,000 vehicles currently enter and leave the MacDill AFB daily, not including retirees, contractors, and other visitors to the Base.

3.8 AIRSPACE AND AIRFIELD OPERATIONS

The airspace region of influence for MacDill AFB includes a 20-nautical-mile radius from the ground surface up to 10,000 feet above MSL. The Tampa Terminal Radar Approach Control (TRACON) provides radar monitoring and advisories within the region. No special use airspace exists within the region.

The MacDill AFB airfield infrastructure includes a pavement system comprised of the runway, paved overruns, parking/maintenance aprons, aircraft taxiways, and arm/disarm pad. The base's one runway, Runway 04/22, runs northeast to southwest with a parallel taxiway, Taxiway G. The runway is 11,421 feet long by 151 feet wide. Both ends of the runway have 1,000 foot long concrete touchdown zones with asphalt between them.

Aircraft parking is concentrated on the north ramp. All of the KC-135 aircraft assigned to the 6th AMW are parked on the north ramp. The south ramp experiences little use, with the occasional transient aircraft utilizing this ramp space. The NOAA aircraft are generally parked inside the hangar 5. Taxiway K, which runs east and west and Taxiway L, which runs northeast to southwest and intersects Taxiway K., connect the main aircraft-parking apron. Taxiway N originates at the same location as Taxiway L but runs northwest and turns into Taxiway F that connects to Runway 04/22. There is an additional parking apron along Taxiway I.

3.8.1 Bird-Aircraft Strike Hazard

MacDill AFB has a bird-aircraft strike hazard (BASH) plan. It provides guidance for reducing the incidents of bird strikes in and around areas where flying operations occur. The plan establishes provisions to disperse information on specific bird hazards and procedures for reporting hazardous bird activity. The design and construction of any facilities within the vicinity of the airfield must comply with certain restrictions such as covering open water areas that may encourage bird foraging activity, and keeping grassed areas cut to regulation height.

3.9 SAFETY AND OCCUPATIONAL HEALTH

A safe environment is one in which there is an absence of or an optimally reduced potential for death, serious bodily injury or illness, or property damage. Human health and safety addresses (1) workers' health and safety during demolition and construction activities and (2) public safety during demolition and construction activities and during subsequent operations of those facilities (Headquarters Air Mobility Command [AMC], 2007).

3.9.1 Construction Safety

Construction site safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risks of illness, injury, death, and property damage. Numerous DoD and USAF regulations designed to comply with standards issued by the OSHA and USEPA safeguard the health and safety of on-site military and civilian workers. These standards specify the amount and type of training required for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits for workplace stressors.

All contractors performing construction activities are responsible for following ground safety and OSHA regulations and are required to conduct construction activities in a manner that does not pose a risk to workers or installation personnel. Industrial hygiene programs address exposure to hazardous materials, use of personal protective equipment, and use and availability of Material Safety Data Sheets. Industrial hygiene is the responsibility of contractors and USAF personnel, as applicable. Contractor responsibilities include the following: to review potentially hazardous workplaces; to monitor exposure to workplace chemical (e.g., asbestos, lead, hazardous material), physical (e.g., noise propagation), and biological (e.g., infectious waste) agents; to recommend and evaluate controls (e.g., ventilation, respirators) to ensure personnel are properly protected or unexposed; and to ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental chemical exposures or engaged in hazardous waste work.

3.10 GEOLOGY AND SOILS

Geological resources consist of the earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography, soils, geology, minerals, and, where applicable, paleontology.

Topography. Topography pertains to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features.

Geology. Geology, which concerns itself with the study of the earth's composition, provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition. Hydrogeology extends the study of the subsurface to water-bearing structures. Hydrogeological information helps in the assessment of groundwater quality and quantity and its movement.

The geological resources information provided in this EA was obtained from the *MacDill Air Force Base General Plan* (USAF, 2010b) and the INRMP (USAF, 2010c). MacDill AFB is in the Pamlico Terrace, which rises gently from the coast to about 25 feet above sea level.

Elevations on the base range from sea level at the southern edge to about 15 feet above sea level in the northern portions. Much of the base is less than 5 feet above mean sea level.

MacDill AFB is situated in the Gulf Coastal Lowlands physiographic region. There are three principal lithologic sequences in the area. The top unit is unconsolidated sand, clay, and marl. This unit might include remnants of the Hawthorn Formation composed of sand, clay, and thin lenses of limestone. Sands in this unit range from 5 to 20 feet thick with clay layers up to 40 feet thick. This surficial layer is very thin or even absent on the eastern side of the base, and underlying limestone formations sometimes outcrop in this area. The next deepest layer is composed of Tampa and Suwannee Limestones, which range from 250 to 500 feet thick. Below this layer are the Ocala Group; Avon Park, Lake City, and Oldsmar Limestones; and Cedar Keys Limestone, which are about 2,300 feet deep.

Sinkholes are common in the Hillsborough County area, but they are uncommon on MacDill AFB because of overlying impervious layers of clay, limited groundwater recharge, and the presence of a slow discharge zone for the Floridan Aquifer. There has also been considerable amount of fill material used in MacDill AFB. Most of this material originated from dredging activities in the surrounding bays. Erosion is an ongoing problem along Gadsden Point at the southeastern corner of the Bay Palms Golf Complex. There is also a problem with sand washing in the boat channel leading to the base marina.

Soils. Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

There are eight soil series, which cover the installation property: Myakka, Urban Land, St. Augustine, Wabasso, Malabar, Arents, Pomello, and Tavares. Two MacDill AFB soils are hydric and thus have jurisdictional wetland implications. Myakka Fine Sand (frequently flooded) is within tidal areas and occurs mainly on mangrove areas. These soils are subject to

tidal flooding, are very level, and are poorly drained. Malabar Fine Sand is generally adjacent to the Myakka Fine Sand. This includes flatwood areas, portions of the golf course, and some development. They are nearly level and poorly drained, often occurring in low-lying sloughs and shallow flatwoods depressions. Myakka is a hydric soil association with Myakka Fine Sand found in tidal areas associated with mangroves. Malabar Fine Sand is also a hydric soil found adjacent to Myakka Fine Sand. There are no prime or unique farmland soils on MacDill AFB.

SECTION 4.0
ENVIRONMENTAL CONSEQUENCES

This section presents an analysis of the potential environmental consequences of the Proposed Action, the Alternatives to the Proposed Action, and the No Action Alternative on the topics evaluated in **Section 3.0**. The Proposed Action is the construction of MRIPs at the locations proposed in Section 2.3. The Proposed Action also includes the relocation of an aircraft wash rack and the construction of an approximately 10,000 sq ft parking lot. The Alternatives to the Proposed Action include design variations to implementation of the Proposed Action. The No Action Alternative was also considered as an alternative to the implementation of the Proposed Action.

4.1 AIR QUALITY

4.1.1 Proposed Action

Air quality impacts would occur during construction of the multiple roadway improvement projects; however, these air quality impacts would be minor and temporary in nature. Fugitive dust (particulate matter) and construction vehicle exhaust emissions would be generated by (1) equipment operation; and (2) entrainment of dust particles by the action of the wind on exposed soil surfaces and debris. The quantity of fugitive dust emissions from the construction site is proportional to the land disturbed and the level of roadway construction activity. These emissions would be greater during the new area site grading. Emissions would vary daily. Equipment travel over temporary roads would generate dust and would fall rapidly within a short distance from the source.

Chapter 62-296.320(4)(c), FAC, requires that no person shall allow the emissions of unconfined particulate matter from any activity (including vehicular movement, transportation of materials, construction, demolition, or wrecking, etc.) without taking reasonable precautions to prevent such emissions. Reasonable precautions include:

- Paving and maintenance of roads, parking areas, and yards;

- Applications of water or chemicals (foam) to control emissions from activities such as demolition, grading roads, construction, and land clearing;
- Application of asphalt, water, or other dust suppressants to unpaved roads, yards, open stock piles, and similar areas;
- Removal of particulate matter from roads and other paved areas under the control of the owner or operator of the facility to prevent reentrainment, and from building or work areas to prevent particulates from becoming airborne; and
- Landscaping or planting of vegetation.

Pollutants from construction equipment and vehicle engine exhausts include NO_x, CO, PM_{10}, $PM_{2.5}$, and VOCs. Internal combustion engine exhausts would be temporary and, like fugitive dust emissions, would not result in long-term impacts.

In order to evaluate the air emissions and their impact to the overall region, the emissions associated with roadway construction activities were compared to the total emissions on a pollutant-by-pollutant basis for the Hillsborough County's 2002 inventory data, as presented in Section 3.1.2. Significant impacts to air quality would be the total emissions of any pollutant that equals ten percent or more of the county's emissions for that specific pollutant. The 10 percent criteria approach is used in the General Conformity Rule as an indicator for impact analysis for nonattainment and maintenance areas and although Hillsborough County is in attainment, the General Conformity Rule's impact analysis was utilized to provide a consistent approach to evaluating the impact of construction. To provide a more conservative evaluation, the impacts screening in this analysis used a more restrictive criteria than required in the General Conformity Rule. Rather than comparing emissions from construction activities to regional inventories (as required in the General Conformity Rule), emissions were compared to the individual county (Hillsborough) potentially impacted, which is a smaller area. Pollutant emission estimates are presented in **Appendix E** and summarized in **Table 4.1.1**.

Table 4.1.1 Proposed Action Air Emissions at MacDill AFB

Pollutant	Proposed Action Annual Emissions (tpy)	Hillsborough County Emissions Inventory[a] (tpy)	Net Change (%)	*de minimis* Values[b] (tpy)	Above/ Below *de minimis*
CO	0.27	6,517	0.0042	100	Below
VOC	0.04	34,880	0.0001	100	Below
NO_X	0.68	58,191	0.0042	100	Below
SO_X	0.03	65,890	0.00005	100	Below
PM10[b]	5.68	22,379	0.025	100	Below
PM2.5	1.14	7,221	0.016	100	Below

a Based on stationary emissions presented in Table 3.1.2.
b Source: 40 CFR 93.153, November 30, 1993.
tpy tons per year
% Percent

As shown in **Table 4.1.1**, the Proposed Action would generate emissions well below 10 percent of the emissions inventory for Hillsborough County and are below the *de minimis* values as stated in 40 CFR 93.153(b). In addition, the emissions would be short-term in nature. Therefore, no significant impact on regional or local air quality would result from implementation of the Proposed Action for the construction projects.

4.1.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design as discussed in Section 2.4. These alternatives would result in equal or lesser environmental impacts when compared to the Proposed Action. As shown in **Table 4.1.2**, the Alternatives to the Proposed Action would generate emissions well below 10 percent of the emissions inventory for Hillsborough County and are below the *de minimis* values as stated in 40 CFR 93.153(b). In addition, the emissions would be short-term in nature. Therefore, no significant impact on regional or local air quality would result from implementation of the Alternatives to the Proposed Action, or in any combination with the Proposed Action.

Table 4.1.2 Alternatives to the Proposed Action Air Emissions at MacDill AFB

Pollutant	Alternatives to the Proposed Action Annual Emissions (tpy)	Hillsborough County Emissions Inventory[a] (tpy)	Net Change (%)	*de minimis* Values[b] (tpy)	Above/ Below *de minimis*
CO	0.13	6,517	0.0019	100	Below
VOC	0.02	34,880	0.0001	100	Below
NO_X	0.31	58,191	0.0005	100	Below
SO_X	0.01	65,890	0.00001	100	Below
PM10[b]	3.18	22,379	0.014	100	Below
PM2.5	0.59	7,221	0.0081	100	Below

a Based on stationary emissions presented in Table 3.1.2.
b Source: 40 CFR 93.153, November 30, 1993.
tpy tons per year

4.1.3 No Action Alternative

The No-Action Alternative would result in no new construction. Therefore, no impacts to air quality would result from the No Action Alternative.

4.1.4 Cumulative Air Quality Impacts

The cumulative air impacts would include air sources from other proposed construction and demolition projects on MacDill AFB during the three-year period needed to complete the construction of the MRIPs. Each of the MRIPs is expected to be completed within three to six months. The MRIPs are not expected to be completed concurrently. A listing of the other proposed construction and demolition projects are presented in **Tables 4.1.3** and **4.1.4**, respectively.

Table 4.1.3 Cumulative Construction Projects at MacDill AFB

Other Proposed Construction Projects	
New USCENTCOM HQ & Demo B540	Logistics Readiness Complex (formerly Trans/Supply Complex)
Consolidated Communication Facility	SOCCENT HQ
JCSE Ops & Logistics Mobility Facility	New CATM
MacDill AFB Gate Improvements	New Child Development Center
JCSE Paint Facility	120 Room Dorm
USCENTCOM Parking Garage	Mission Support Facility
Warehouse Complex	JCSE Squadron Facility

Table 4.1.4 Cumulative Demolition Projects at MacDill AFB

Facility Number	
500	540
510	541
119	543
317	178
397	3176
398	3500
258	297
2020	1051
1053	265
89	848
860	861
886	JCSE Temp DJC2
1066	373

Details of the other proposed construction and demolition projects are included in **Appendix E**. Pollutant emission estimates are presented in **Appendix E** and summarized in **Table 4.1.5**. Based on the calculations provided in **Appendix E** and presented in **Table 4.1.5**, the cumulative annual emission estimates fall below the *de minimis* level of 100 tons per year for all five pollutants evaluated.

Table 4.1.5 Cumulative Air Emissions at MacDill AFB

Pollutant	Cumulative Annual Emissions (tpy)	Hillsborough County Emissions Inventory[a] (tpy)	Net Change (%)	*de minimis* Values[b] (tpy)	Above/ Below *de minimis*
CO	25.59	6,517	0.15	100	Below
VOC	7.14	34,880	0.02	100	Below
NO_X	59.18	58,191	0.10	100	Below
SO_X	4.00	65,890	0.01	100	Below
PM10[b]	64.98	22,379	0.29	100	Below
PM2.5	10.91	7,221	0.15	100	Below

[a] Based on stationary emissions presented in Table 3.1.2.
[b] Source: 40 CFR 93.153, November 30, 1993.
tpy Tons per year
%Percent

4.2 NOISE

The primary human response to environmental noise is annoyance (American Industrial Hygiene Association, 1986). The degree of annoyance has been found to correlate well with the DNL. Annoyance for short-term activities, such as construction noise and fire fighting, could be influenced by other factors such as awareness and attitude toward the activity creating the noise.

Several social surveys have been conducted in which people's reaction to their noise environment has been determined as a function of DNL occurring outside their homes. Guidelines have been developed for individual land uses based upon the information collected in these surveys and upon information concerning activity interference. For various land uses, the level of acceptability of the noise environment is dependent upon the activity that is conducted and the level of annoyance, hearing loss, speech interference, and sleep interference that results there from.

4.2.1 Proposed Action

Noise impacts from construction activities associated with the Proposed Action would be a function of the noise generated by construction equipment, the location and sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Normally, roadway construction activities are completed in stages and each stage has its own noise characteristics based on the mixture of construction equipment in use.

The highest calculated cumulative energy equivalent sound levels from roadway construction activities are estimated to be approximately 85 dB at 50 feet from the point where work is being conducted. Typical noise levels at 50 feet for equipment used during construction include the following: 80 dB for bulldozers, 83 dB for cranes, 85 dB for backhoes, and 91 dB for trucks (USEPA, 1971).

Given the extent of the projects under the Proposed Action and the proximity to residents on-base, impacts from construction noise are unavoidable. Facility occupants likely to experience noise in the immediate vicinity of the MRIPs, include: USCENTCOM and Coalition Village, Security Forces, Surf's Edge Club, the MacDill Housing Office and residence of the Chevron Park area. However, construction noise is short-term and only occurs during the daylight hours. Construction equipment would be used only as necessary and would be maintained to the manufacturer's specifications to minimize noise impacts. Efforts would be employed to prevent the staging of equipment and/or materials near these residences and construction fencing would be utilized to minimize impacts associated with construction. The magnitude of these impacts would be directly tied to the proximity of the occupied facility to the roadway construction site. The impacts may vary according to the activity occurring on any particular day, and impacts would cease when roadway construction is completed. The noise associated with the proposed roadway construction would be categorized as minor since it does not involve major construction efforts. It is not anticipated that the short-term increase in ambient noise levels from the Proposed Action would cause significant adverse impacts on the surrounding populations.

Under the Proposed Action, potential noise impacts to the above-mentioned occupied facilities would occur during the roadway improvement projects, the removal and relocation of the washrack, and construction activities associated with the proposed parking lot. Once the proposed projects are completed, the ambient noise level would return to its normal level. However, it is anticipated that vehicle traffic in the area adjacent to Chevron Park would increase under the proposed SOCOM Memorial Drive Extension Project (NVZR100035) as an increased number of commuters who would be able to utilize Bayshore Boulevard to access the Base. Therefore, insignificant long-term impacts on the ambient noise level within the Chevron Park residential area would occur as a result of an extension of SOCOM Memorial Drive. Consequently, the Proposed Action would have an insignificant impact on noise at MacDill AFB.

4.2.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design as discussed in Section 2.4. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action. Therefore, insignificant impact on noise at MacDill AFB would result from implementation of the Alternatives to the Proposed Action.

4.2.3 No Action Alternative

The No-Action Alternative would result in no new construction and traffic conditions at the Base would remain unchanged. Therefore, no impacts on noise would result from the No Action Alternative.

4.2.4 Cumulative Noise Impacts

Cumulative noise exposure can lead to human health effects such as permanent hearing loss. The cumulative noise impacts on Base would include noise sources from the proposed roadway construction activities, and other construction projects near the vicinity of the project area, including the construction of the USCENTCOM Parking Garage. The proposed construction and demolition projects listed above in Tables 4.1.3

and 4.1.4 are not planned to occur simultaneously and therefore the noise impacts from these proposed projects are short term in nature and are spread throughout the Base. In general, noise levels associated with the identified construction activities are minor and insignificant when compared to noise impacts from aircraft arriving and departing from the Base.

4.3 HAZARDOUS MATERIAL, WASTES, AND STORED FUEL

The following section describes hazardous waste and materials, ERP, sanitary wastewater treatment, and stored fuels management.

4.3.1 Proposed Action

4.3.1.1 Hazardous Materials

Hazardous materials, such as paint, adhesives, and solvents, may be on site during roadway activities. All hazardous materials would be temporarily stored and disposed of per Base procedures. All construction-related hazardous materials, including petroleum products, would be removed and disposed of according to Base procedures following the completion of tasks. No impacts from hazardous materials are anticipated to occur as a result of roadway construction activities associated with the Proposed Action.

4.3.1.2 Wastes

A temporary increase in the generation of solid waste would occur during roadway construction activities associated with the Proposed Action. Roadway materials would be recycled and/or reused to the maximum extent practicable, and any roadway base soils that did not meet the engineering requirements for the new roadways would be reused as "clean" fill material for other projects on the base.

As noted in Section 4.3.1.3 below, several of the MRIPs are located within a designated ERP site. Contact with impacted media (i.e. soils or groundwater) from this ERP would not be expected, as the roadway improvements would be completed on the near surface soils.

Notwithstanding the above, there would be an increase in solid waste resulting from the disposal of unusable roadway construction debris generated during the roadway construction projects. Local off-base waste handling services/facilities have sufficient capacity to handle this increased output. Since the number of personnel on base or the function of the multiple organizations would not change with the Proposed Action, there would be no long-term increase in solid waste generation after completion of the project.

It is anticipated that the quantity of hazardous wastes generated from proposed roadway construction activities would be negligible. Contractors would be required to properly manage and dispose of their own hazardous waste. Therefore, the implementation of the Proposed Action would be negligible to the base's hazardous waste management program.

4.3.1.3 Environmental Restoration Program

The Proposed Action would involve construction in a portion of ERP site SWMU-61. None of the constituents of concern at the site represents an immediate threat to life and health. SWMU 61 is an area designated as a groundwater contamination plume of low-level chlorinated solvents and petroleum that extends from the north ramp east to Hillsborough Bay, and underlies a portion of the MRIPs. Additionally, the Great Egret Avenue extension roadway project would extend north of SWMU 35, specifically Buildings 518 and 552 oil-water separator sites. SWMU 35 Buildings 518 and 552 are within the footprint of SWMU 61. The chemicals of concern (COCs) have been identified in soil [carcinogenic Polynuclear Aromatic Hydrocarbons (PAHs)], groundwater (antimony), and sediment [carcinogenic and noncarcinogenic PAHs, one polychlorinated biphenyl (PCB), and metals]. Since the Proposed Action does not involve excavations that would encounter the water table, the proposed roadway construction projects are not expected to impact SWMU 61 or SWMU 35.

Although the potential for encountering contaminated media at these sites is very limited, the potential does exist. Consequently, the construction contractor would be required to prepare a site-specific health and safety plan that meets the requirements of 29 CFR

1910.120(b)(4). In addition, the construction contractor must use workers that have received 40-hour Hazardous Waste Operator training with an 8-hour annual refresher in accordance with 29 CFR 1910.120 for those portions of the project where exposures could potentially occur.

If contaminated media is encountered during roadway construction work, the MacDill ERP manager would be contacted to insure that the material is managed in accordance with ERP guidelines. Based on these conditions, the Proposed Action should not represent a significant impact on the ERP Program.

4.3.1.4 Sanitary Wastewater Treatment

The Proposed Action would have no impact on sanitary wastewater treatment.

4.3.1.5 Stored Fuels

The Proposed Action would have no impact on stored fuels management.

4.3.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design of the Proposed Action, as discussed in Section 2.4. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action. Therefore, no impacts to hazardous waste and materials, ERP, sanitary wastewater treatment, and stored fuels management would result from the Alternatives to the Proposed Action.

4.3.3 No Action Alternative

The No-Action Alternative would result in no new construction. Therefore, no impacts to hazardous waste and materials, ERP, sanitary wastewater treatment, and stored fuels management would result from the No Action Alternative.

4.4 WATER RESOURCES

4.4.1 Proposed Action

A small amount of soil erosion may occur during roadway construction since portions of the soil surface would be exposed and disturbed during the Proposed Action. Soil

erosion in areas that are disturbed would be minimized by implementing a sediment and erosion control plan, adopting Best Management Practices (BMPs) such as permanent retention ponds, temporary sediment basins, silt fencing, re-vegetation of disturbed areas, and berms. This EA has been prepared under the assumption that the site would, at a minimum, be covered with a clean layer of graded and grassed fill and sod. Erosion from this surface, once the fill and sod is in place, would be minimal. There would be no long-term impacts to water resources once the project is complete.

Under the Proposed Action, there are no direct discharges to groundwater. The proposed roadways and parking lot would increase the impervious surface on the base by approximately 58,000 square feet (1.3 acres); however, the parking lot would include appropriately-sized stormwater treatment/attenuation areas. The stormwater treatment/attenuation areas would collect surface water runoff from the parking lot and allow it to infiltrate into the ground, recharging the groundwater in the surficial aquifer or treat a specified volume of stormwater by wet and/or dry detention. There would be a minor beneficial impact to water resources as there would be an increase in retention area, and/or a corresponding decrease in direct discharges to Hillsborough Bay waters.

The proposed expansion of Great Egret Avenue is in the immediate vicinity of a drainage canal as are the proposed Bayshore Boulevard and South Boundary Boulevard widening projects. Expansion of Great Egret Avenue would involve construction of a large box culvert in a drainage canal to permit the roadway to cross the canal. The South Boundary Boulevard widening and Bayshore Boulevard widening projects would involve construction of an extension to an existing culvert to permit the roadway to cross the canal. Construction around the drainage canals, especially construction of the culverts in the canals, could result in impacts to surface water caused by the runoff of disturbed surface soils and increased water turbidity caused by disturbance of side wall and bottom sediments in the canals. The use of properly installed silt fencing along the edge of the drainage canals would significantly reduce inflow of surface soils entrained in stormwater runoff. To reduce the turbidity impacts caused by construction of the

culverts, floating turbidity barriers would be installed across the canals on either side of the area proposed for installation of the culverts. Turbidity barriers would help contain the sediments that would be entrained in the water column during construction. Upon completion of the construction work in the drainage canals, the turbidity barriers would be left in place until vegetation (sod) is re-established along the canal bank.

The MacDill AFB Engineering office (or design-build multiple award construction contract [MACC] contractor), in coordination with the Environmental office, would apply for the appropriate stormwater management permit through the Southwest Florida Water Management District (SWFWMD). Any specific stormwater permitting requirements for the Proposed Action would be identified by the SWFWMD during the permitting process. Design drawings of the permanent parking lot including appropriate stormwater treatment/attenuation areas (retention pond) would be submitted to the SWFWMD for approval during the stormwater permitting process. The parking lot and stormwater treatment/attenuation area design would be modified, if required, to accommodate any permitting requirements identified by the SWFWMD.

No significant increase in potable water usage would be expected to occur. No impacts to existing water supplies would occur. Under the Proposed Action there would be a minor beneficial impact to water resources as there would be an increase in retention area, and/or a corresponding decrease in direct discharges to Hillsborough Bay waters.

4.4.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design to the Proposed Action, as discussed in Section 2.4. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action. No significant increase in potable water usage is expected to occur. No impacts to existing water supplies would occur. Under the Alternatives to the Proposed Action there would be a minor beneficial impact to water resources as there would be an increase in retention area, and/or a corresponding decrease in direct discharges to Hillsborough Bay waters.

4.4.3 No Action Alternative

The No Action Alternative would not extend or expand any of the existing roadways or construct a permanent parking lot; and therefore, would not result in impacts to water resources.

4.5 FLOODPLAINS

In accordance with the requirements of EO 11988, the Air Force must demonstrate that there is no practicable alternative to carrying out the Proposed Action within the flood pool or floodplain. MacDill Air Force Base covers 5,638 acres of land at the southern tip of the Interbay Peninsula. Approximately 80 percent of the land at MacDill, or about 4,510 acres, is located in the 100-year floodplain. The Proposed Action roadway improvement areas and parking lot are located within the 100-year floodplain. As a result, the project would involve minor construction in the 100-year floodplain, as well as an increase in impervious surface in the floodplain. Consequently, impacts to the floodplain must be addressed. It is impossible to expand or extend existing roadways and avert the 100-year floodplain. Therefore, there is no practical alternative to completing the minor construction work and permanent parking lot in the floodplain.

4.5.1 Proposed Action

All of the areas included in the Proposed Action are located in the 100-year floodplain. The project would generally have a minor negative impact to the floodplain due to an increase in total impervious surface; however, the construction of stormwater treatment/ attenuation areas greatly reduces the total impact. The Proposed Action would increase the total impervious surface in the floodplain by approximately 58,000 square feet or 1.3 acres. That increase represents the use of 0.03 percent of the total acreage located in the floodplain. The increased impervious surface would reduce the potential for rainwater or floodwater to infiltrate quickly and evenly. This increased runoff has the potential of increasing the pollutant loading on Hillsborough Bay. The MRIP's and the parking area designs include large stormwater treatment/attenuation areas so that rainwater falling on

new roadways or the parking lot surface drains toward the stormwater treatment/attenuation areas. Storm water within the wash rack would be managed through the sanitary sewer system. The stormwater treatment/attenuation areas are sized according to the total impervious surface created by the project and conform to local (SWFWMD) environmental regulations. Since the stormwater treatment/attenuation areas would compensate for and collect the increase surface water runoff and reduce the potential for flooding, the Proposed Action would not have a significant impact on the 100-year floodplain.

In accordance with EO 11988, *Floodplain Management*, the USAF must demonstrate that there are no practicable alternatives to construction within a floodplain. The Proposed Action would occur in the 100-year floodplain. However, long-term use of the roadway improvements and parking lot would not permanently damage floodplain values, including fish and wildlife habitat, or water quality. Nor would the Proposed Action pose a threat to human life, health, or safety. Under the Proposed Action, no long-term negative impacts to the floodplain would occur.

4.5.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design as discussed in Section 2.4. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action. Under the Alternatives to the Proposed Action, no long-term negative impacts to the floodplain would occur.

4.5.3 No Action Alternative

The No Action Alternative would continue operation of the existing traffic patterns and would not implement any of the MRIPs, construction of parking areas, or construction of a new aircraft wash rack. This alternative would not alter the potential for loss or damage resulting from floods or increase the impacts of floods on human safety, health and welfare. Consequently, this alternative would not have a negative impact on floodplain values.

4.6 BIOLOGICAL RESOURCES

4.6.1 Proposed Action

4.6.1.1 Wetlands

In accordance with EO 11990, *Protection of Wetlands*, the USAF must demonstrate that there are no practicable alternatives to carrying out the Proposed Action. EO 11990 applies to new construction and defines that term to include draining, dredging, channelizing, filling, diking, impounding, and related activities and any structures or facilities begun or authorized after the effective date of this Order (May 24, 1977). Implementation of the Proposed Action would have an impact on wetlands.

Jurisdictional wetlands are in the vicinity of the Proposed Action and include two drainage canals which transect Zemke Avenue and South Boundary Boulevard on the southern side of the USCENTCOM Complex and Bayshore Boulevard west of the USCENTCOM Complex. The northern canal is a narrow northeast/southwest drainage canal that runs between the USCENTCOM compound and the NAVCENT/MARCENT compound. The southern canal is also a northeast/southwest drainage canal located just south of Zemke Avenue, which begins at a stormwater outfall near the aircraft washrack. Both drainage canals are classified as estuarine scrub/shrub emergent wetland and are tidally influenced, connecting directly to Hillsborough Bay, approximately 500 feet east and southeast of the USCENTCOM Complex. The Proposed Action involves construction activities in and adjacent to these drainage canals. The largest impact would result from construction of one box-type culvert and an extension of an existing box culvert in the drainage canals to permit construction of roadways.

It is not possible to extend Great Egret Avenue, widen South Boundary Boulevard or Bayshore Boulevard and avoid the drainage canals. The proposed road widening projects could occur on either side of the canals without a culvert extension to widen the canal crossing. However, this would not meet the selection criteria to improve traffic flow. Therefore, there is no practical alternative to completing the construction work in the wetland. Consequently, impacts to the wetland must be addressed.

EO 11990 directs each agency to provide for early public review of plans for construction in wetlands. In accordance with EO 11990, construction and extension of the box culverts in the drainage canals would involve coordination with the state (FDEP) and Federal (USCOE) regulatory agencies. At a minimum, construction of a box culvert would require application for a Notice General permit through the FDEP and USCOE in accordance with Chapter 40D.400.439 FAC. Permit requirements would be identified during a pre-application meeting with the FDEP once funding for the project has been secured.

Although the Proposed Action would impact wetlands, primarily through construction of a box culvert and the extension of an existing box culvert, adverse impacts would be avoided, to include the wetland communities of Tampa Bay. Further, adverse impacts to wetlands would be avoided or result in insignificant impacts through the proper use of erosion and floating turbidity control structures and other BMPs, such as permanent retention ponds, temporary sediment basins, silt fencing, re-vegetation of disturbed areas, and berms. Consultation with the state and Federal regulatory agencies would also be completed to insure that no environmental issues are overlooked and environmental impacts are reduced. Consequently, no significant impacts to wetlands are anticipated to occur upon completion of the Proposed Action.

4.6.1.2 Wildlife

Due to an increase in turbidity in the surface water of the drainage canals near the proposed box culvert and roadway crossings, the Proposed Action could have a minor short-term impact on aquatic life. The proposed construction work would disturb bottom sediments that increase water turbidity. Increased water turbidity can affect aquatic animal life by altering feeding patterns and disorienting aquatic organisms in freshwater environments. The use of erosion and turbidity control structures would significantly reduce the amount and lateral extent of turbidity impacts to surface water, thereby reducing the impacts to aquatic life. It is presumed that any mobile aquatic life, such as fish or invertebrates, would temporarily leave the area while construction activities are

occurring and return once construction is completed. No long-term impacts to aquatic life are anticipated.

Short-term impacts to wildlife that could result from the Proposed Action include the temporary disturbance of some avian species that utilize the drainage canals for feeding. Some avian species, especially the long-legged waders that forage in the drainage canals around the base, would be temporarily displaced from the canal while construction activities are occurring. Other similar, suitable foraging habitat is available on base. However, upon completion of the project the birds should return and there would be no long-term impacts to wildlife from the Proposed Action. Therefore, no significant impacts to wildlife are expected from the implementation of the Proposed Action.

4.6.1.3 Listed Species Habitat

The drainage canal is not critical habitat for any listed species. Some listed avian species that use the drainage canal for feeding could be temporarily displaced during implementation of the Proposed Action. This is a relatively minor, short-term impact that would not significantly affect listed species on MacDill AFB. Consequently, the Proposed Action would only have a minor, short-term impact on listed species at MacDill AFB.

Table 3.6.4 includes the Federally-listed and state-listed species that potentially occur at MacDill AFB. Coordination with the U.S. Fish and Wildlife Service has been completed to insure compliance with the Endangered Species Act. Agency correspondence letters are included in **Appendix D**.

4.6.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design of the Proposed Action, as discussed in Section 2.4. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action. Consequently, no significant impacts to biological resources are anticipated to occur from implementation of the Alternatives to the Proposed Action.

4.6.3 No Action Alternative

No new construction would occur with implementation of the No Action Alternative and no impacts to biological resources would occur.

4.7 TRANSPORTATION

4.7.1 Proposed Action

The Proposed Action would alter traffic patterns within the Base through expansion and extension of multiple roadways, construction of the canal crossings, and construction of a permanent parking lot. Long-term improvements to transportation patterns around the Base would result from the Proposed Action. Short-term adverse impacts to transportation patterns in the northeast portion of the base could result from the Proposed Action since sections of roadway may be partially or fully closed during construction. Short-term adverse impacts to traffic flow along these roads would result from the proposed roadway construction activities, particularly along South Boundary Boulevard. The long-term improvements to traffic flow created by the Proposed Action outweigh the minor negative short-term impacts.

4.7.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design of the Proposed Action, as discussed in Section 2.4. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action. Consequently, the long-term improvements to traffic flow created by the Alternatives to the Proposed Action outweigh the minor negative short-term impacts caused resulting from implementation of the construction projects.

4.7.3 No Action Alternative

Under the No Action Alternative, no impacts to transportation would occur since the MRIPs and the parking lot would not be constructed, and traffic conditions at the Base would remain unchanged.

4.8 AIRSPACE/AIRFIELD OPERATIONS AND BIRD-AIRCRAFT STRIKE HAZARD

4.8.1 Proposed Action

The Proposed Action could have an impact on Airspace/Airfield Operation or BASH. One of the proposed MRIPs includes the extension of Great Egret Avenue from MacDill Avenue to South Boundary Boulevard, crossing a portion of the north flight apron. The construction of this roadway extension would include stormwater treatment/attenuation areas that conform to local (SWFWMD) environmental regulations as discussed in Section 4.5.1. If located on the flight apron, these necessary stormwater provisions may inadvertently act as avian attractants. Therefore, for the portion of the Great Egret Avenue extension near the flight apron, stormwater would not be allowed to accumulate. Shallow drainage swales would be used to collect stormwater from the roadway and route it to stormwater retention areas located east and west of the flight apron.

The extension of Great Egret Avenue would truncate a portion the northwestern end of the North Apron, resulting in an overall reduction in apron space. This portion of the apron was principally used by aircraft approaching the wash rack. As the relocation of the wash rack is proposed, this loss of apron area is not considered to significantly impact airfield operations. The use of dust control methods would be implemented prior, during, and after construction of the Great Egret Avenue extension project in order to minimize fugitive dust emissions on airfield operations.

Additionally, given that the proper avian attractant control measures would be implemented during construction of the Great Egret Avenue extension project, the Proposed Action should have a negligible insignificant impact on Airspace/Airfield Operation or Bird-Aircraft Strike Hazard.

4.8.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design of the Proposed Action, as discussed in Section 2.4. These alternatives are considered to result in equal or

lesser environmental impacts when compared to the Proposed Action. Therefore, the Alternatives to the Proposed Action should have a negligible insignificant impact on Airspace/Airfield Operation or Bird-Aircraft Strike Hazard.

4.8.3 No Action Alternative

Under the No Action Alternative, no impacts to Airspace/Airfield Operation or Bird-Aircraft Strike Hazard would occur since the Great Egret Avenue extension would not occur.

4.9 SAFETY AND OCCUMPATIONAL HEALTH

4.9.1 Proposed Action

4.9.1.1 Construction Safety

The Proposed Action would pose safety hazards to the workers similar to those associated with typical industrial construction projects, such as falls, slips, heat stress, and machinery injuries. Construction would not involve any unique hazards and all construction methods would comply with OSHA requirements to ensure the protection of workers and the general public during construction. Specifically, safety precautions employed during construction activities, such as construction fencing, would be applied to ensure that the Proposed Action does not pose any adverse health or safety risks to children and/or residents in the Chevron Park residential area. Governmental oversight of contractor activities would help assure OSHA compliance.

The Proposed Action would involve roadway construction and demolition activities in or adjacent to two ERP sites (SWMU 61, SWMU 35 B518 and B552) but would not involve excavations that would likely encounter contaminated soil or groundwater. None of the chemicals of concern at the site represent an immediate threat to life and health.

If contaminated media is encountered during construction or demolition activities, work would be stopped and the contaminated material would be removed by OSHA Hazardous Waste Operator and Emergency Response 40-hour-certified workers and managed in accordance with ERP guidelines. Implementation of this work approach would

dramatically reduce the potential for impacts to worker health and safety. Consequently, no impacts to safety and occupational health would be incurred with implementation of the Proposed Action.

4.9.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design of the Proposed Action, as discussed in Section 2.4. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action. Consequently, no impacts to safety and occupational health would be incurred with implementation of the Alternatives to the Proposed Action.

4.9.3 No Action Alternative

No impacts on safety and occupational health would be incurred under the No Action Alternative.

4.10 GEOLOGY AND SOILS

4.10.1 Proposed Action

Soils exposed during construction of the box culvert and roadway grading activities would be subject to erosion and a small amount of soil erosion is expected during the project since portions of the soil surface would be exposed and disturbed. Soil erosion in areas that are disturbed would be controlled by implementation of a sediment and erosion control plan, which would include implementation of BMPs such as permanent retention ponds, temporary sediment basins, silt fencing, re-vegetation of disturbed areas, and berms.

This EA has been prepared under the assumption that all non-impervious areas disturbed during construction and demolition activities would, at a minimum, be covered with a clean layer of graded fill. Covering the areas of exposed soil created during construction and demolition with sod would significantly reduce the potential for erosion. Overall, the impacts to soils would be minimal and temporary and are not considered significant.

4.10.2 Alternatives to the Proposed Action

The Alternatives to the Proposed Action are variations on the final design as discussed in Section 2.4. These alternatives are considered to result in equal or lesser environmental impacts when compared to the Proposed Action. Therefore, impacts to soils from Alternatives to the Proposed Action would be minimal and temporary and are not considered significant.

4.10.3 No Action Alternative

No impacts to geology and soils would be incurred with implementation of the No Action Alternative.

4.11 INDIRECT AND CUMULATIVE IMPACTS

There are no site-specific direct, indirect, or cumulative impacts associated with the Proposed Action, the Alternatives to the Proposed Action, or the No Action Alternative.

4.12 UNAVOIDABLE ADVERSE IMPACTS

There are no significant unavoidable adverse impacts associated with the Proposed Action, the Alternatives to the Proposed Action, or No Action Alternative.

4.13 RELATIONSHIP BETWEEN SHORT-TERM USES AND ENHANCEMENT OF LONG TERM PRODUCTIVITY

Implementation of the Proposed Action would have a positive effect on long-term productivity by meeting the current and future mission requirements and increasing the efficiency of base operations. Implementation of the Proposed Action provides the infrastructure and force protection measures required to effectively complete mission goals.

4.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The Proposed Action would irreversibly commit fuels, manpower, materials, and costs required to complete the proposed scope of work.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 5.0 PERSONS CONTACTED

Christina Hummel	6 CES/CEPP MacDill AFB, FL 33621 813-828-0836
John Hess	6 CES/CEPP MacDill AFB, FL 33621 813-828-1145
Scott Edwards	Division of Historical Resources Compliance Review Section 500 S. Bronough Street Tallahassee, FL 32399-0250 1-800-847-7278
Tish Matty	6 CES/CEVR MacDill AFB, FL 33621 813-828-4554
Steve Boyd	6 CES/CEP MacDill AFB, FL 33621 813-828-5420
Kristy Snyder	6 CES/CEVR MacDill AFB, FL 33621 813-828-0789
Michael Cooley	6 CES/CEC MacDill AFB, FL 33621 813-828-0855
Mark Sramek	NOAA's National Marine Fisheries Service Southeast Region, Habitat Conservation Division 263 13th Avenue South St. Petersburg, FL 33701-5505
Linda Smith	US Fish and Wildlife Service 600 4th Street South St. Petersburg, FL 33701

	727-570-5398
Jasmine Raffington	FL Coastal Management Program Florida State Clearing House 2555 Shumard Oak Blvd. Tallahassee, FL 32399-2100 850-414-6568

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 6.0
LIST OF PREPARERS

Ms. Kristin Lehman
ATC Associates, Inc.
5602 Thompson Center Court, Suite 405
Tampa, Florida 33634
e-mail: kristin.lehman@atcassociates.com

Mr. R. Daniel Lewis, P.G.
ATC Associates, Inc.
5602 Thompson Center Court, Suite 405
Tampa, Florida 33634
e-mail: robert.lewis@atcassociates.com

Mr. Jason Kirkpatrick
6 CES/CEVN
7621 Hillsborough Loop Dr.
MacDill AFB, FL 33621-5207
Voice: (813) 828-0459
FAX: (813) 828-2212
e-mail: jason.kirkpatrick.CTR@macdill.af.mil

Mr. Andrew Rider
6 CES/CEV
7621 Hillsborough Loop Dr.
MacDill AFB, FL 33621-5207
Voice: (813) 828-2718
FAX: (813) 828-2212
e-mail: andrew.rider @macdill.af.mil

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 7.0
REFERENCES

Advisory Council on Historic Preservation, 1986	*36 CFR Part 800: Protection of Historic Properties*. U.S. Government Printing Office, Washington, D.C.
Federal Interagency Committee on Urban Noise (FICUN), 1980	Federal Interagency on Committee Urban Noise, Guidelines for Considering Noise in Land Use Planning and Control, June 1980.
Florida Natural Areas Inventory (FNAI), 1996	Florida Natural Areas Inventory, 1996. Biological Survey of MacDill Air Force Base.
Headquarters Air Mobility Command [AMC], 2007	HQ AMC, 2007. Environmental Assessment of Installation Development at MacDill Air Force Base.
Paul, 1992	Paul, R. and A. Schnapf. 1992. MacDill Air Force Base Wildlife Survey. Tampa Bay Sanctuaries, National Audubon Society, Tampa, FL.
State of Florida, 1981	Florida Coastal Management Program.
United States Environmental Protection Agency (USEPA), 2002	National Emission Inventory Database, United States Environmental Protection Agency, AirData Website: http://www.epa.gov/oar/data/neidb.html.
USEPA, 1995	Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, 5th Edition (AP-42), USEPA, Research Triangle Park, January 1995 (Supplement A, February 1996).

USEPA, 1988 — Gap Filling PM_{10} Emission Factors for Selected open Area Dust Sources (EPA-450/4-88-003), United States Environmental Protection Agency, Research Triangle Park, February 1988.

USEPA, 1985 — Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources, 4th Edition (AP-42), USEPA, Ann Arbor, September 1985, (Supplement A, January 1991).

USEPA, 1971 — Noise from Construction Equipment and Operation, Building Equipment and Home Appliances.

United States Air Force (USAF), 2010a — United States Air Force, 2010. Transportation Study MacDill Air Force Base, Draft Final Report. Prepared for MacDill AFB, Contract Number CON004306.

USAF, 2010b — U.S. Air Force, 2010. MacDill Air Force Base General Plan.

USAF, 2010c — U.S. Air Force, 2010. Integrated Natural Resource Management Plan (INRMP) MacDill Air Force, Florida.

USAF, 2010d — U.S. Air Force, 2010. Title V Permit No. 0570141-001-AV MacDill Air Force Base, Florida.

USAF, 2008 — U.S. Air Force, 2008. Air Installation Compatible Use Zone (AICUZ) Study, MacDill AFB, Tampa.

USAF, 2007a — U.S. Air Force, 2007. Asbestos Management and Operations Plan, MacDill AFB, FL.

USAF, 2007b — U.S. Air Force, 2007. Lead-Based Paint Management Plan, MacDill AFB, FL.

USAF, 2006a — U.S. Air Force, 2006. Integrated Cultural Resources

Management Plan (ICRMP) MacDill Air Force, Florida.

USAF, 2005 — U.S. Air Force, 2005. Endangered Species Population Survey, MacDill AFB, Tampa.

USAF, 2003 — Economic Resource Impact Statement MacDill Air Force Base, Florida.

USAF, 1998a — U.S. Air Force, 1998. Delineation Study of the Waters of the United States Including the Landward Extent of Wetlands and Surface Waters MacDill Air Force Base Tampa, Hillsborough County, Florida.

USAF, 1998b — U.S. Air Force, 1998. Environmental Compliance Assessment and Management Program (ECAMP), MacDill Air Force Base, Florida.

USAF, 1998c — U.S. Air Force, 1998. Entry Gate Development Study MacDill Air Force Base, Florida.

USAF, 1996a — U.S. Air Force, 1996. Biological Survey of MacDill Air Force Base – Final Report.

USAF, 1996b — U.S. Air Force, 1996. Endangered Species Management Plan MacDill Air Force Base, Florida.

USAF, 1995a — U.S. Air Force, 1995. Environmental Assessment for Implementation of the Integrated Natural Resources Management Plan MacDill Air Force Base, Florida.

USAF, 1994 — U.S. Air Force, 1994. Environmental Assessment, Transfer and Reuse of Part of MacDill Air Force Base, Florida.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

AIR FORCE FORM 813

THIS PAGE INTENTIONALLY LEFT BLANK

REQUEST FOR ENVIRONMENTAL IMPACT ANALYSIS

Report Control Symbol RCS: 000710-01

INSTRUCTIONS: *Section I to be completed by Proponent. Sections II and III to be completed by Environmental Planning Function. Continue on separate sheets as necessary. Reference appropriate item number(s).*

SECTION I – PROPONENT INFORMATION

1. TO *(Environmental Planning Function)*	2. FROM *(Proponent Organization and functional address symbol)*	2a. TELEPHONE NO.
6 CES/CEVN	6 CES/CEP	813-828-2543

3. TITLE OF PROPOSED ACTION

Implement Multiple Roadway Improvement Projects

4. PURPOSE AND NEED FOR ACTION *(Identify decision to be made and need date)*

See Attached

5. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES (DOPAA) *(Provide sufficient details for evaluation of the total action)*

See Attached

6. PROPONENT APPROVAL (Name and Grade)	6a. SIGNATURE	6b. DATE
Bob Fisher, ctr		20091231

SECTION II – PRELIMINARY ENVIRONMENTAL SURVEY *(Check appropriate box and describe potential environmental effects including cumulative effects) (+=positive effect; 0=no effect; - = adverse effect; U=unknown effect)*	+	0	-	U
7. AIR INSTALLATION COMPATIBLE USE ZONE/LAND USE *(Noise, accident potential, encroachment, etc.)*		x		
8. AIR QUALITY *(Emissions, attainment status, state implementation plan, etc.)*			x	
9. WATER RESOURCES *(Quality, quantity, source, etc.)*				x
10. SAFETY AND OCCUPATIONAL HEALTH *(Asbestos/radiation/chemical exposure, explosives safety quantity distance, bird/wildlife aircraft hazard, etc.)*		x		
11. HAZARDOUS MATERIALS/WASTE *(Use/storage/generation, solid waste, etc.)*		x		
12. BIOLOGICAL RESOURCES *(Wetlands/floodplains, threatened or endangered species, etc.)*				x
13. CULTURAL RESOURCES *(Native American burial sites, archaeological, historical, etc.)*		x		
14. GEOLOGY AND SOILS *(Topography, minerals, geothermal, Installation Restoration Program, seismicity, etc.)*				x
15. SOCIOECONOMIC *(Employment/population projections, school and local fiscal impacts, etc.)*	x			
16. OTHER *(Potential impacts not addressed above.)*				x

SECTION III – ENVIRONMENTAL ANALYSIS DETERMINATION

17.		
		PROPOSED ACTION QUALIFIES FOR CATEGORICAL EXCLUSION (CATEX) #
	x	PROPOSED ACTION DOES NOT QUALIFY FOR A CATEX; FURTHER ENVIRONMENTAL ANALYSIS IS REQUIRED.

18. REMARKS

MacDill AFB is located in an Air Quality Control Region that is in attainment. Direct emissions from construction and indirect emissions from visiting traffic and/or follow-on operations, when totaled are less than the *de minimus* amounts in 40 CFR 93.153; therefore, a conformity determination is not required.

19. ENVIRONMENTAL PLANNING FUNCTION CERTIFICATION (Name and Grade)	19 a. SIGNATURE	19 b. DATE
ROBERT B. HUGHES, YF-03 Director, 6th Civil Engineer Squadron		8 JAN 10

4.0 PURPOSE AND NEED FOR ACTION:

Traffic congestion on MacDill AFB continues to be an issue as base functions and tenant organizations continue to expand. The base population has grown from approximately 7,000 to nearly 20,000 personnel since 2001. Although alternative transportation options are available, including vanpools, mass transit, and car pooling, the current traffic study shows that nearly 80% of the base population still commutes to work alone in their personal vehicles. This equates to nearly 15,000 vehicles entering and leaving the base daily, not including retirees, contractors, and other visitors to the base.

MacDill AFB intends to implement several roadway improvement projects in FY110/FY12 that will help improve traffic flow by widening an existing roadway and expanding outlets around the primary choke point for traffic leaving the base. Implementing the roadway improvement projects would widen the primary artery that carries vehicles off base and would create additional exit routes which should help commuters avoid driving past the USCENTCOM complex, where pedestrians must cross South Boundary Boulevard temporarily bringing traffic to a stop.

5.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES:

5.1. PROPOSED ACTION – The Proposed Action would construct multiple roadway projects which would improve, expand, and extend existing roadways to permit greater traffic flow and increase the inter-connection between Bayshore Boulevard, South Boundary Boulevard, and Great Egret Avenue. In general, all of the projects are aimed at improving traffic flow by reducing congestion around the USCENTCOM Complex where traffic slow-downs are common due to pedestrian traffic. The roadway improvement projects are being designed in FY10 and planned for implementation in FY11 and FY12. The projects are programmed as individual projects and would most likely not be implemented at the same time. In total, these roadway improvements are expected to cost $4.5M. A brief description of each roadway project is provided below.

5.1.1 The first roadway improvement project is NVZR050039 Repair/Upgrade Intersections USCENTCOM Area. The programmed amount for this project is $700K. The project would repair and/or alter roadways and associated storm drainage systems for the roads in the vicinity of the USCENTCOM Complex as necessary to improve traffic flow. The project would also provide traffic controls along roadways near the USCENTCOM Complex to improve safety, particularly for pedestrians. This project is not expected to substantially increase impervious surfaces on base.

5.1.2 Project number NVZR100035 Extend SOCOM Memorial Drive would create a direct connection between Hillsborough Loop Drive and Bayshore Boulevard just north of the existing housing area. The project is programmed to cost $455K. This project would permit traffic to easily route over to Bayshore Boulevard and avoid traffic congestion around the USCENTCOM Complex. This project would also remove the existing intersection and traffic signals where Tampa Point Drive intersects Bayshore Boulevard. This project is expected to create approximately 9,600 square feet of new asphalt surface.

5.1.3 A second roadway extension project is the Extend Zemke Avenue project, number NVZR 100033. The programmed amount for this project is $910K. This project would construct a new roadway between the eastern end of Zemke Avenue and Bayshore Boulevard. The road would run along the north side of an existing drainage canal. This project would also remove CENTCOM Avenue, located just north of Zemke Avenue eliminating the intersections at both end of the road (at Bayshore Boulevard and South Boundary Road). The project would allow traffic from USCENTCOM to have direct access to Bayshore Boulevard. Also, eliminating CENTCOM Avenue would improve Antiterrorism/Force Protection (AT/FP) by providing increase reaction time for gate guards at the Bayshore Gate. This project would remove an existing roadway and create a new road resulting in a net increase in impervious surface of approximately 6,000 square feet.

5.1.4 One of the roadway projects involves widening of South Boundary Boulevard in the section between Building 552 and Zemke Avenue. The project is titled South Boundary Lane Widening (NVZR100047) and is estimated to cost $720K. This section of road is three lanes at the southern end but narrows to only two lanes as you approach CENTCOM Avenue. South Boundary Boulevard is currently the principle exit route for commuter leaving the base through the MacDill Gate and Dale Mabry Gate. The project would add a second north bound traffic lane between Hangar Loop and Zemke Ave to resolve traffic congestion problems. Widening South Boundary Boulevard would create approximately 8,400 square feet of additional asphalt surface on base.

5.1.5 The final roadway improvement project is Extend Great Egret Street (NVZR100036). This project is programmed at a value of $900K. The project would connect the east end of Great Egret Road to South Boundary Boulevard just south of the intersection with Zemke Avenue. This roadway project would cut across the northern portion of the North Flight Apron and would also require removal of the aircraft washrack facility located at the north end of the flight apron. The project would utilize the existing concrete of the north apron as much as possible. This roadway project would create 24,000 square feet of additional asphalt surface.

5.2. NO ACTION ALTERNATIVE – The No Action Alternative would not implement any of the proposed roadway improvement projects. This alternative result in continued traffic congestion, especially during morning and evening rush hour, along South Boundary Boulevard around the CENTCOM Complex. This alternative would not eliminate CENTCOM Avenue and therefore not correct the current AT/FP issue with the Bayshore Gate. The No Action Alternative is not the preferred alternative.

6.0 CATEGORICAL EXCLUSION - The Environmental Planning Function at MAcDill AFB has determined that the Proposed Action is not applicable for a Categorical Exclusion and requires further environmental impact analysis.

7.0 EXECUTIVE ORDER 11988 – FLOODPLAIN MANAGEMENT: The location of the proposed project is located in the 100-year coastal floodplain (Figure 2). Executive Order 11988, Floodplain Management, seeks to avoid construction of facilities or structures within floodplains “to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by

floodplains". As part of the environmental impact analysis process, this project shall be evaluated for compliance with Executive Order 11988 to ensure that the above referenced goals are met.

Figure 1 – General location of the proposed multiple roadway improvement projects on MacDill AFB.

FIGURE 2: Specific locations for proposed roadway improvement projects.

FIGURE 3: General location of proposed roadway improvement work overlaid again base constraints in this portion of the base.

APPENDIX B

PUBLIC NOTICE AND AGENCY COORDINATION LETTERS

THIS PAGE INTENTIONALLY LEFT BLANK

From Page 1

Poland.

The Obama administration canceled the original plan in September 2009, proposing instead a reconfigured missile shield that would begin with ship-based interceptors and radars, followed by more advanced land-based interceptors to be deployed in Romania by 2015 and Poland by 2018.

The United States has asked Turkey, also a member of NATO, to host some of the radar defenses and to approve the proposal for a Europe-wide defense network. Turkey has hesitated, saying it does not want the system explicitly to target Iran, its neighbor.

U.S. officials close to pre-summit talks were optimistic that the remaining obstacles could be overcome. They said Russia seems to be seriously considering NATO's plan, and Turkey's concerns could be finessed.

From Page 1

McConnell's decision.

"But we can't stop with earmarks, as they represent only part of the problem," Obama said. "I look forward to working with Democrats and Republicans to not only end earmark spending, but to find other ways to bring down our deficits for our children."

McConnell's move heads off a battle with conservative Republican senators who had signaled they would force a vote today on banning the practice. That vote is a formality. Republicans in the House also plan to vote on a ban this week.

Robert Bixby, the executive director of the Concord Coalition, a nonpartisan budget watchdog group, said, "It's a good-government issue more than a fiscal one."

According to the nonprofit group Taxpayers for Common Sense, McConnell has been one of the most prolific beneficiaries of the earmark system. In the three years since public disclosure of earmark has sought nearly $1 billion worth of earmarks, mostly benefiting his home state of Kentucky.

By late Monday, 27 Republican senators and senators-elect had gone on record supporting the ban, including Florida Sen.-elect Marco Rubio.

The anti-earmark push has been led by Sen. Jim DeMint, R-S.C.

"Senator McConnell's support for the earmark moratorium demonstrates the kind of bold leadership our party needs," DeMint said. "His statement today and tomorrow's vote to enact the moratorium will send a clear signal to voters that Republicans heard the message of the last election."

House Democrats are likely to discuss changes in earmark policy this week but are unlikely to back a ban.

However, since the GOP will control spending bills in the House next year, it probably will strike earmarks from legislation there. In the Senate, though, Democrats will reach a potential showdown on the issue when the two chambers must agree on spending legislation.

Democrats have cut back on earmarks in the past. In 2007, House Democratic leaders cut the number of earmarks in half and required lawmakers to disclose any earmarks they received as well as the beneficiary. Lawmakers also had to certify that they had no financial interest in them.

Senators agreed to the certification rule but not the disclosure provisions.

Last year, the House agreed to require lawmakers to disclose all their requests on their websites, and House Republicans banned all earmarks, a practice all GOP members except four followed. This year, House Democrats banned awarding earmarks to for-profit companies. Senators, however, adopted none of the changes.

Information from McClatchy-Tribune and The Associated Press was used in this report.

Histo

On Nov. 16, 1960, Acac Award-winning actor died in Los Angeles at shortly after he comp filming "The Misfits" v Marilyn Monroe.

On this date:

1776: British troops ca Fort Washington in Ne during the American F

1907: Oklahoma beca 46th state of the unic

1959: The Rodgers an merstein musical "The Music" opened on Bro

1966: Physician Samu Sheppard was acquitt second trial in the slay pregnant wife, Marilyr

1973: Skylab 4, carryir of three astronauts, w launched from Cape C on an 84-day mission.

1982: An agreement v nounced in the 57th d strike by National Foo League players.

Ten years ago: Al Gc legal fight to expand r

LEGAL ADVERTISEMENT

PUBLIC NOTICE - UNITED STATES AIR FORCE

The Air Force (AF) seeks public comment on AF Environmental Impact Analysis Process (EIAP) documents for the Proposed Construction of Multiple Roadway Improvement Projects at MacDill Air Force Base. The Proposed Action is a multi-year phased construction effort which would implement multiple roadway improvements including: widening and/or extending several primary Base roadways to provide improve traffic flow and to alleviate current commuter congestion points; and the construction of additional parking areas to relieve the parking shortages on Base. MacDill AFB has evaluated this action in accordance with Executive Order 11988 – Floodplain Management, and with Executive Order 11990 – Protection of Wetlands and believes there is no practical alternative to construction within the floodplain or jurisdictional wetlands, primarily drainage canals.

U.S. AIR FORCE

NOTICE OF AVAILABILITY

The EIAP documents satisfy the requirements of the National Environmental Policy Act (NEPA). The documents are available for public review and comment from November 16th through December 17th, 2010 at the Tampa/Hillsborough County Public Library, located at 900 N. Ashley Drive, Tampa, FL 33606. The documents may be found in the Humanities Section of the Main Library. Address written comments to the 6 AMW Public Affairs, 8209 Hangar Loop Drive, Suite 14, MacDill AFB, FL 33621-5502. The telephone number is (813) 828-2215.

LEGAL ADVERTISEMENT

PUBLIC NOTICE - UNITED STATES AIR FORCE

The Air Force (AF) seeks public comment on AF Environmental Impact Analysis Process (EIAP) documents for the Proposed Construction of Multiple Roadway Improvement Projects at MacDill Air Force Base. The Proposed Action is a multi-year phased construction effort which would implement multiple roadway improvements including: widening and/or extending several primary Base roadways to provide improve traffic flow and to alleviate current commuter congestion points; and the construction of additional parking areas to relieve the parking shortages on Base. MacDill AFB has evaluated this action in accordance with Executive Order 11988 – Floodplain Management, and with Executive Order 11990 – Protection of Wetlands and believes there is no practical alternative to construction within the floodplain or jurisdictional wetlands, primarily drainage canals.

U.S. AIR FORCE

NOTICE OF AVAILABILITY

The EIAP documents satisfy the requirements of the National Environmental Policy Act (NEPA). The documents are available for public review and comment from November 16th through December 17th, 2010 at the Tampa/Hillsborough County Public Library, located at 900 N. Ashley Drive, Tampa, FL 33606. The documents may be found in the Humanities Section of the Main Library. Address written comments to the 6 AMW Public Affairs, 3209 Hangar Loop Drive, Suite 14, MacDill AFB, FL 33621-5502. The telephone number is (813) 828-2215.

838

November 16, 2010

The Tampa Tribune

Published Daily

Tampa, Hillsborough County, Florida

RECEIVED
NOV 17 2010
By

ı }
ɔorough } SS.

ersigned authority personally appeared C. Pugh, who on oath says that
ertising Billing Analyst of The Tampa Tribune, a daily newspaper
ampa in Hillsborough County, Florida; that the attached copy of the

Metro IN THE Tampa Tribune

f Legal Notices

in said newspaper in the issues of

11/16/2010

says that the said The Tampa Tribune is a newspaper published at Tampa in
ugh County, Florida, and that the said newspaper has heretofore been
ublished in said Hillsborough County, Florida, each day and has been entered
ss mail matter at the post office in Tampa, in said Hillsborough County, Florida
one year next preceding the first publication of the attached copy of
; and affiant further says that she has neither paid nor promised any person,
this advertisement for publication in the said newspaper.

Sworn to and subscribed by me, this 16 day
of NOV, A.D. 2010

Personally Known ✓ or Produced Identification ___
Type of Identification Produced _____

Notary Public State of Florida
Charlotte A Offner
My Commission DD895783
Expires 06/03/2013

Order # 0002975470

1018532 -- ATC ASSOC. INC

From: Robert Lewis [mailto:robert.lewis@atcassociates.com]
Sent: Friday, January 07, 2011 8:41 AM
To: 'Kristin Lehman'
Subject: FW: MacDill AFB Draft EA for Construction of Multiple Roadway Improvement Projects - State Clearance

---

From: Milligan, Lauren [mailto:Lauren.Milligan@dep.state.fl.us]
Sent: Thursday, January 06, 2011 11:14 AM
To: robert.lewis@atcassociates.com
Cc: 'RIDER, ANDREW W CTR Contractor AMC 6 CES/CEVW'; Jason.Kirkpatrick.CTR@macdill.af.mil
Subject: MacDill AFB Draft EA for Construction of Multiple Roadway Improvement Projects - State Clearance

Mr. R. Daniel Lewis, P.G.
Environmental Division Manager
ATC Associates, Inc.
5602 Thompson Center Court, Suite 405
Tampa, FL 33634

RE: Department of the Air Force – Draft Environmental Assessment for Construction of Multiple Roadway Improvement Projects, MacDill Air Force Base – Hillsborough County, Florida.
SAI # FL201101055589C

Dear Mr. Lewis:

Florida State Clearinghouse staff has reviewed the subject Draft Environmental Assessment (EA) under the following authorities: Presidential Executive Order 12372; Section 403.061(40), *Florida Statutes;* the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

Please note that the proposed roadway construction projects will require the issuance of environmental resource permits (ERPs) for stormwater management and wetland crossings from the Southwest Florida Water Management District (SWFWMD). Further inquiries concerning the state's permitting requirements should be directed to ERP Program staff in the SWFWMD's Tampa Regulation Department at (813) 985-7481.

Based on the information contained in the Draft EA, minimal project impacts and previous State Historic Preservation Officer comments, the state has determined that, at this stage, the proposed activities are consistent with the Florida Coastal Management Program (FCMP). The state's continued concurrence will be based on the activities' compliance with FCMP authorities, including federal and state monitoring of the activities to ensure their continued conformance, and the adequate resolution of any issues identified during subsequent regulatory reviews. The state's final concurrence of the projects' consistency with the FCMP will be determined during the environmental permitting process in accordance with Section 373.428, *Florida Statutes.*

If you have any other questions regarding this message or the state intergovernmental review process, please don't hesitate to contact me at (850) 245-2170 or Lauren.Milligan@dep.state.fl.us. Thank you.

Best regards,

Lauren P. Milligan

Lauren P. Milligan, Environmental Manager
Florida State Clearinghouse
Florida Department of Environmental Protection
3900 Commonwealth Blvd, M.S. 47
Tallahassee, FL 32399-3000
ph. (850) 245-2170
fax (850) 245-2190

The Department of Environmental Protection values your feedback as a customer. DEP Secretary Mimi Drew is committed to continuously assessing and improving the level and quality of services provided to you. Please take a few minutes to comment on the quality of service you received. Simply click on this link to the DEP Customer Survey. Thank you in advance for completing the survey.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5317; FAX 824-5300

December 13, 2010 F/SER46:DR/mt

Jason Kirkpatrick
6 CES/CEVN
7621 Hillsborough Loop Drive
MacDill AFB, Florida 33621-5207

Dear Mr. Kirkpatrick:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the draft Environmental Assessment (EA) dated November 2010, regarding the construction of multiple road improvement projects at MacDill Air Force Base in Hillsborough County, Florida. The projects are designed to reduce current vehicular congestion, relieve parking shortages, and improve pedestrian safety.

NMFS concurs with the Finding of No Significant Impact. It appears that the construction of stormwater treatment systems and use of best management practices, outlined in the EA, should be sufficient to address NMFS concerns related to living aquatic resources within Hillsborough Bay and greater Tampa Bay.

If you have questions regarding our views on this project, please contact Dr. Dave Rydene in our St. Petersburg, Florida office. Dr. Rydene may be reached at the letterhead address or by calling (727) 824-5379.

Sincerely,

W. Mark Thompson

for Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

cc:
F/SER4
F/SER46 - Rydene

FLORIDA DEPARTMENT OF STATE
Dawn K. Roberts
Interim Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. R. Daniel Lewis
ATC Associates, Inc.
5602 Thompson Center Court, Suite 405
Tampa, Florida 33634

July 29, 2010

RE: DHR Project File Number: 2010-5502
U.S. Department of the Air Force
Draft Environmental Assessment and Draft Finding of No Significant Impact for the Proposed Construction of Multiple Roadway Improvements at MacDill Air Force Base
Hillsborough County

Dear Mr. Moore:

This office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places.* The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966,* as amended, *36 CFR Part 800: Protection of Historic Properties* and the *National Environmental Policy Act of 1969,* as amended.

This office previously reviewed this project in July 2010 (DHR No. 2010-3629) and it is was and still is the opinion of this office that the above-referenced undertaking will have no effect on historic properties.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservationist, by electronic mail *sedwards@dos.state.fl.us*, or at 850.245.6333 or 800.847.7278.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

United States Department of the Interior
U. S. FISH AND WILDLIFE SERVICE
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:

FWS Log No. 41910-2010-I-0419

September 1, 2010

Mr. Robert D. Moore
Deputy Director, 6th Civil Engineer Squadron
Department of the Air Force
6th Air Mobility Wing (AMC)
MacDill Air Force Base, FL 33621

Dear Mr. Moore:

Our office has received your request for information regarding endangered and threatened species and their habitats for the Implementation of Multiple Roadway Improvements at MacDill AFB. The proposed project is located in Hillsborough County, Florida.

Based on the project description and location, the Fish and Wildlife Service has determined that no impacts to Federally listed species will occur as a result of the proposed action. Should project plans change, or additional information on distribution of listed or proposed species become available, this determination may be reconsidered.

If you have any questions regarding this response, please contact Mr. Todd Mecklenborg at (727) 820-3705.

Sincerely,

Linda L Walker

David L. Hankla
for Field Supervisor

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C

CONSISTENCY STATEMENT

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C
CONSISTENCY STATEMENT

This consistency statement will examine the potential environmental consequences of the Proposed Action and ascertain the extent to which the consequences of the Proposed Action are consistent with the objectives of Florida Coastal Management Program (CMP).

Of the Florida Statutory Authorities included in the CMP, impacts in the following areas are addressed in the EA: beach and shore preservation (Chapter 161), historic preservation (Chapter 267), economic development and tourism (Chapter 288), public transportation (Chapters 334 and 339), saltwater living resources (Chapter 370), living land and freshwater resource (Chapter 372), water resources (Chapter 373), environmental control (Chapter 403), and soil and water conservation (Chapter 582). This consistency statement discusses how the proposed options may meet the CMP objectives.

CONSISTENCY DETERMINATION

Chapter 161: Beach and Shore Preservation

No disturbances to the base's canals are foreseen under the Proposed Action or Alternative Actions.

Chapter 267: Historic Preservation

The Air Force and the Florida State Historic Preservation Officer have determined that the Proposed Action would have no effect on historic properties associated with the Base.

Chapter 288: Economic Development and Tourism

The EA presents the new employment impact and net income impact of the Proposed Action and alternative. The options would not have significant adverse effects on any key Florida industries or economic diversification efforts.

Chapter 372: Saltwater Living Resources

The EA addresses potential impacts to local water bodies. Water quality impacts were surveyed for existing conditions at the Proposed Action and alternatives. Results indicate that no impacts would result from the Proposed Action or alternatives.

Chapter 372: Living Land and Freshwater Resources

Threatened and endangered species, major plant communities, conservation of native habitat, and mitigation of potential impacts to the resources are addressed in the EA. The Proposed Action and alternatives would not result in permanent disturbance to native habitat and should not impact threatened or endangered species.

Chapter 373: Water Resources

There would be no impacts to surface water or groundwater quality under the Proposed Action or alternatives as discussed in the EA.

Chapter 403: Environmental Control

The EA addresses the issues of conservation and protection of environmentally sensitive living resources; protection of groundwater and surface water quality and quantity; potable water supply; protection of air quality; minimization of adverse hydrogeologic impacts; protection of endangered or threatened species; solid, sanitary, and hazardous waste disposal; and protection of floodplains and wetlands. Where impacts to these resources can be identified, possible mitigation measures are suggested. Implementation of mitigation would be, for the most part, the responsibility of MacDill AFB.

Chapter 582: Soil and Water Conservation

The EA addresses the potential of the Proposed Action and alternatives to disturb soil and presents possible measures to prevent or minimize soil erosion. Impacts to groundwater and surface water resources also are discussed in the EA.

CONCLUSION

The Air Force finds that the conceptual Proposed Action and alternatives plans presented in the EA are consistent with Florida's CMP.

APPENDIX D

PROPOSED ROADWAY IMPROVEMENT SITE PHOTOGRAPHS

THIS PAGE INTENTIONALLY LEFT BLANK

Photo #1: View of the CENTCOM Avenue area looking east, proposed for removal under the Zemke Avenue Extension project.

Photo #2: View of the proposed SOCOM Memorial Drive Extension area looking west.

THIS PAGE INTENTIONALLY LEFT BLANK

Photo #3: View of the proposed Zemke Avenue Extension area looking north.

Photo #4: View of the Tampa Point Boulevard intersection looking east, proposed for removal under the SOCOM Memorial Drive Extension Project.

THIS PAGE INTENTIONALLY LEFT BLANK

Photo #5: View of the proposed South Boundary Blvd Widening project area looking north.

Photo #6: View of the proposed Great Egret Avenue Extension area and Wash Rack looking west.

THIS PAGE INTENTIONALLY LEFT BLANK

Photo #7: View of one of the alternative locations for the Parking Lot construction project.

Photo #8: View of one of the alternative locations for the Parking Lot construction project.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E

AIR EMISSION CALCULATIONS FOR PROPOSED ACTION AND CUMULATIVE AIR EMISSIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E CUMULATIVE CONSTRUCTION EMISSION ESTIMATES

Summary Summarizes total emissions by calendar year for cumulative projects.

Projects Included Summarizes construction and demolition projects included for cumulative analysis.

Combustion Estimates emissions from non-road equipment exhaust as well as painting.

Fugitive Estimates fine particulate emissions from earthmoving, vehicle traffic, and windblown dust.

Grading Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.

Tier Report Summarizes total emissions for Hillsborough County, FL for 2002, to be used to compare project to county emissions.

Air Quality Emissions from Total Cumulative Construction Projects

Construction Emissions from Cumulative Projects	NO_x (typ)	VOC (typ)	CO (typ)	SOx (typ)	PM_{10} (typ)	$PM_{2.5}$ (typ)
New CENTCOM Construction and Demolition	4.74	0.75	2.08	0.36	9.31	1.26
Consolidated Communication Facility Construction	2.32	0.33	1.02	0.18	0.76	0.22
Consolidated Communication Fac - Demo Bldg 265	0.09	0.01	0.04	0.00	0.04	0.01
JCSE Ops Facility Construction	2.34	0.41	1.03	0.18	1.66	0.31
JCSE Ops Facility -Demo Bldg 89	0.35	0.02	0.14	0.01	0.16	0.04
JCSE Ops Facility -Demo Bldg 848	0.06	0.00	0.03	0.00	0.02	0.01
JCSE Ops Facility -Demo Bldg 860	0.03	0.00	0.01	0.00	0.00	0.00
JCSE Ops Facility -Demo Bldg 861	1.23	0.07	0.48	0.02	0.58	0.12
JCSE Ops Facility -Demo Bldg 886	0.05	0.00	0.02	0.00	0.02	0.00
JCSE Ops Facility -Demo Temp DJC2	0.20	0.01	0.08	0.00	0.09	0.02
MacDill Gate	0.34	0.02	0.13	0.01	0.34	0.08
JCSE Paint Facility	2.32	0.24	1.02	0.18	0.26	0.17
CENTCOM Parking Garage Construction	4.67	1.00	2.05	0.36	9.54	1.24
CENTCOM Parking - Demo Bldg 1051	0.23	0.01	0.09	0.00	0.10	0.02
CENTCOM Parking - Demo Bldg 1053	0.13	0.01	0.05	0.00	0.06	0.01
Warehouse Complex	4.70	0.53	2.07	0.36	9.66	1.30
Logistics Readiness Complex	5.08	0.61	2.22	0.37	5.01	1.16
SOCCENT HQ	5.03	0.64	2.20	0.37	12.07	1.75
New CATM	4.72	0.44	2.08	0.36	0.97	0.44
New CDC	4.70	0.52	2.07	0.36	5.43	0.87
120 Room Dorm	4.63	0.52	2.04	0.36	1.88	0.49
Mission Support - Demo Building 1066	0.09	0.01	0.04	0.00	0.04	0.01
Mission Support - Demo Building 373	0.53	0.03	0.21	0.01	0.25	0.05
JCSE Squadron Facility	4.68	0.60	2.06	0.36	1.80	0.52
Building 53 Consolidation - Demo Bldg 297	0.19	0.01	0.07	0.00	0.08	0.02
Building 53 Consolidaiton - Demo Bldg 258 & 2020	0.52	0.03	0.21	0.01	0.25	0.05
Building 500 Demolition	0.65	0.04	0.26	0.01	0.31	0.07
Building 510 Demolition	0.04	0.00	0.02	0.00	0.01	0.00
Building 119 Demolition	0.04	0.00	0.02	0.00	0.01	0.00
Building 317 Demolition	0.08	0.00	0.03	0.00	0.03	0.01
Building 397 Demolition	0.58	0.03	0.23	0.01	0.28	0.06
Building 398 Demolition	0.07	0.00	0.03	0.00	0.02	0.01
Building 540 Demolition	3.50	0.21	1.38	0.07	3.89	0.57
Building 541 Demolition	0.06	0.00	0.02	0.00	0.02	0.01
Building 543 Demolition	0.08	0.00	0.03	0.00	0.03	0.01
Building 178 Demolition	0.05	0.00	0.02	0.00	0.02	0.00
Building 3176 Demolition	0.02	0.00	0.01	0.00	0.00	0.00
Building 3500 Demolition	0.02	0.00	0.01	0.00	0.00	0.00
Total Cumulative Emissions	**59.18**	**7.14**	**25.59**	**4.00**	**64.98**	**10.91**

Since future year budgets were not readily available, actual 2002 air emissions inventories for the county was used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

APPENDIX E CUMULATIVE CONSTRUCTION EMISSION ESTIMATES

Hillsborough County

Point and Area Sources Combined						
Year	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
2002	58,191	34,880	6,517	65,890	22,379	7,221

Source: USEPA-AirData NET Tier Report (http://www.epa.gov/air/data/geosel.html). Site visited on 28 June

Determination Significance (Significance Threshold = 10% or above De minimus values) for Construction Activities

	Point and Area Sources Combined					
	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Hillsborough County Emissions	58,191	34,880	6,517	65,890	22,379	7,221
10% of Hills. County Emissions	5,819	3,488	652	6,589	2,238	722
Cumulative Emissions	59.176	7.138	25.595	3.995	64.984	10.914
Cumulative Construction %	**0.102%**	**0.020%**	**0.393%**	**0.006%**	**0.290%**	**0.151%**
Regionally Significant?	**no**	**no**	**no**	**no**	**no**	**no**

APPENDIX E PROPOSED ACTION CONSTRUCTION EMISSION ESTIMATES

Summary Summarizes total emissions for each project by calendar year.

Combustion Estimates emissions from non-road equipment exhaust as well as painting.

Fugitive Estimates fine particulate emissions from earthmoving, vehicle traffic, and windblown dust.

Grading Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.

Tier Report Summarizes total emissions for Hillsborough County, FL for 2002, to be used to compare project to county emissions.

Air Quality Emissions from Total Proposed Action Projects

Construction Emissions from Proposed Action	NO_x (tpy)	VOC (tpy)	CO (tpy)	SOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Eliminate CENTOM Avenue	0.13	0.01	0.05	0.00	0.13	0.02
Extend SOCOM Memorial Drive	0.07	0.00	0.03	0.00	0.41	0.07
Eliminate Intersection at Tampa Point and Bayshore	0.04	0.00	0.02	0.00	0.02	0.00
Extend Zemke Avenue	0.04	0.00	0.02	0.02	0.25	0.05
Widen South Boundary Boulevard	0.04	0.00	0.02	0.00	0.36	0.06
Extend Great Egret Street	0.09	0.01	0.04	0.00	1.01	0.18
Construct Parking Lot	0.07	0.00	0.03	0.00	0.42	0.07
Relocate Aircraft Wash Rack	0.11	0.01	0.05	0.00	1.17	0.34
Other Potential Roadway Improvement Projects	0.09	0.01	0.04	0.00	1.91	0.35
TOTAL	**0.68**	**0.04**	**0.27**	**0.03**	**5.68**	**1.14**

Air Quality Emissions Total from Alternatives to Proposed Action Projects

Construction Emissions from Proposed Action	NO_x (tpy)	VOC (tpy)	CO (tpy)	SOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Construct Parking Lot - Alternate Location	0.07	0.00	0.03	0.00	0.42	0.07
Relocate Aircraft Wash Rack - Alternate Location	0.13	0.01	0.05	0.00	2.62	0.48
Modify Alignment of Tampa Point Blvd	0.11	0.01	0.04	0.00	0.13	0.03
TOTAL	**0.31**	**0.02**	**0.13**	**0.01**	**3.18**	**0.59**

Since future year budgets were not readily available, actual 2002 air emissions inventories for the county was used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

Hillsborough County

Point and Area Sources Combined						
Year	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
2002	58,191	34,880	6,517	65,890	22,379	7,221

Source: USEPA-AirData NET Tier Report (http://www.epa.gov/air/data/geosel.html). Site visited on 28 June 2010.

APPENDIX E PROPOSED ACTION CONSTRUCTION EMISSION ESTIMATES

Determination Significance (Significance Threshold = 10%) for Proposed Activities

	Point and Area Sources Combined					
	NO_x (tpy)	**VOC (tpy)**	**CO (tpy)**	**SO_2 (tpy)**	**PM_{10} (tpy)**	**$PM_{2.5}$ (tpy)**
Hillsborough County Emissions	58,191	34,880	6,517	65,890	22,379	7,221
10% of Hills. County Emissions	5,819	3,488	652	6,589	2,238	722
Proposed Action Emissions	0.680	0.040	0.271	0.030	5.685	1.141
Proposed Action %	**0.001%**	**0.000%**	**0.004%**	**0.000%**	**0.025%**	**0.016%**
Regionally Significant?	**no**	**no**	**no**	**no**	**no**	**no**

	Point and Area Sources Combined					
	NO_x (tpy)	**VOC (tpy)**	**CO (tpy)**	**SO_2 (tpy)**	**PM_{10} (tpy)**	**$PM_{2.5}$ (tpy)**
Hillsborough County Emissions	58,191	34,880	6,517	65,890	22,379	7,221
10% of Hills. County Emissions	5,819	3,488	652	6,589	2,238	722
Alternative Proposed Action Emissions	0.313	0.018	0.125	0.006	3.179	0.586
Alternative Proposed Action %	**0.001%**	**0.000%**	**0.002%**	**0.000%**	**0.014%**	**0.008%**
Regionally Significant?	**no**	**no**	**no**	**no**	**no**	**no**

* US EPA - AirData Emissions by Category Report - Criteria Air Pollutants, http://www.epa.gov/air/data/geosel.html
* Monday, 13-Jul-2009 at 1:59:26 PM (USA Eastern time zone)
* Geographic Area: Hillsborough Co, FL
* Pollutant: Carbon Monoxide, Nitrogen Oxides, Particles < 10 micrometers diameter, Particles < 2.5 micrometers diameter, Sulfur Dioxide, Volatile Organic Compounds
* Year: 2002
*
* Pollutant Emissions In Tons Per Year
*

			Point Source Emissions						Nonpoint+Mobile Source Emissions					
State	**County**	**Tier I**	**CO**	**NOx**	**PM10**	**PM2.5**	**SO2**	**VOC**	**CO**	**NOx**	**PM10**	**PM2.5**	**SO2**	**VOC**
FL	Hillsborough Co	01-Fuel Comb. Elec. Util.	1727	55765	6349	4918	64629	190	0	0	0	0	0	0
FL	Hillsborough Co	02-Fuel Comb. Industrial	150	296	18.1	14.2	15.4	13.6	467	984	9.46	6.39	72.4	29.3
FL	Hillsborough Co	03-Fuel Comb. Other	18.6	59	4.66	4.29	3.54	4.67	1846	788	304	289	501	696
FL	Hillsborough Co	04-Chemical & Allied Product Mfg	0	185	183	58.8	0	2.81	0	0	0	0	0	407
FL	Hillsborough Co	05-Metals Processing	790	1.44	45.4	15.4	577	33.6	0	0	0	0	0	0
FL	Hillsborough Co	06-Petroleum & Related Industries	72.6	19.5	35.5	20.3	20.5	26.3	0	0	0	0	0	0
FL	Hillsborough Co	07-Other Industrial Processes	74.6	17.6	368	136	46.8	131	129	0	544	371	0	347
FL	Hillsborough Co	08-Solvent Utilization	0.28	1.11	16.3	5.93	0	646	0	0	0	0	0	20032
FL	Hillsborough Co	09-Storage & Transport	42.1	13.9	387	125	0.44	493	0	0	0	0	0	11391
FL	Hillsborough Co	10-Waste Disposal & Recycling	23.8	31.4	27.3	19.8	1.01	12.4	48.5	14.6	13	9.23	9.18	174
FL	Hillsborough Co	14-Miscellaneous	0	0	0	0	0	0	1128	14.1	14074	1228	13.3	250
FL	Hillsborough Co	11-Highway Vehicles	0	0	0	0	0	0	228413	25546	706	506	1283	22321
FL	Hillsborough Co	12-Off-Highway	0	0	0	0	0	0	94881	21593	1291	1243	2597	8341
		TOTAL	2,899	56,390	7,434	5,318	65,294	1,553	326,913	48,940	16,941	3,653	4,476	63,988

Criteria Air Pollutant	**CO (tpy)**	**NO_x (tpy)**	**PM_{10} (tpy)**	**$PM_{2.5}$ (tpy)**	**SO2 (tpy)**	**VOC (tpy)**	**Pb (tpy)**
Point Sources	2,899	56,390	7,434	5,318	65,294	1,553	-
Area Sources	3,619	1,801	14,944	1,904	596	33,326	-
Stationary Total	**6,517**	**58,191**	**22,379**	**7,221**	**65,890**	**34,880**	
On-road Mobile	228,413	25,546	706	506	1,283	22,321	-
Non-road Mobile	94,881	21,593	1,291	1,243	2,597	8,341	-
Mobile Total	**323,294**	**47,139**	**1,997**	**1,749**	**3,880**	**30,662**	
Grand Total	**329,811**	**105,330**	**24,376**	**8,970**	**69,770**	**65,542**	**4.46**

Eliminate CENTCOM AVENUE
Project Summary

Includes:

1 100% of Eliminate CENTCOM Avenue 6,000 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	6,000	ft^2	If project includes any demolition, include here
Total Paved Area:	0	ft^2	
Total Disturbed Area:	9,000	ft^2	Total Disturbed Area is usually larger than the building being demolished unless the facility demolished is multi-story. If larger, do not use the sum from above, replace with your own value in cell "C14".
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	0.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.13	0.01	0.05	0.00	0.01	0.01
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	0.12	0.01
Total Project Emissions (tpy)	**0.130**	**0.008**	**0.051**	**0.003**	**0.126**	**0.019**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0002%	0.00002%	0.00079%	0.000004%	0.0006%	0.0003%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	9,000	0.21	1	(from "GRADING" below)
Paving:	0	0.00	0	
Demolition:	6,000	0.14	7	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	-	-	-	-	-	-
Demolition	219.06	12.99	86.67	4.38	13.25	12.85
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	260.70	15.56	102.37	5.21	15.79	15.32

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**260.70**	**15.56**	**102.37**	**5.21**	**15.79**	**15.32**
Total Project Combustion Emissions (tons)	**0.1304**	**0.0078**	**0.0512**	**0.0026**	**0.0079**	**0.0077**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	-	months
Area	-	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	0.00	0.00	0.00	0.00
General Construction Activities	0.24	0.12	0.01	0.01
Total	**0.24**	**0.12**	**0.01**	**0.01**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.21 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.21	0.03
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.21	0.10
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.10	0.10
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.10	0.04
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.21	0.07
TOTAL								0.35

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.35
Qty Equipment: 3.00
Grading days/yr: **0.12**

Extend SOCOM Memorial Drive
Project Summary

Includes:

1 100% of Extend SOCOM Memorial Drive 9,600 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	0	ft^2	If project includes any demolition, include here
Total Paved Area:	9,600	ft^2	
Total Disturbed Area:	19,200	ft^2	Roadway Improvement Projects could disturb more than the paved area. If so, cell "C14" should be
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	6.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.07	0.00	0.03	0.00	0.00	0.00
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	0.40	0.07
Total Project Emissions (tpy)	**0.066**	**0.004**	**0.026**	**0.001**	**0.407**	**0.072**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0001%	0.00001%	0.00041%	0.000002%	0.0018%	0.0010%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	19,200	0.44	1	(from "GRADING" below)
Paving:	9,600	0.22	2	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	90.73	5.21	37.16	1.81	5.55	5.39
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	132.38	7.79	52.87	2.65	8.10	7.85

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**132.38**	**7.79**	**52.87**	**2.65**	**8.10**	**7.85**
Total Project Combustion Emissions (tons)	**0.0662**	**0.0039**	**0.0264**	**0.0013**	**0.0040**	**0.0039**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	0.56	0.28	0.06	0.03
General Construction Activities	0.25	0.13	0.01	0.01
Total	**0.81**	**0.40**	**0.07**	**0.03**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.44 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.44	0.06
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.44	0.22
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.22	0.22
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.22	0.09
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.44	0.15
TOTAL								0.74

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.74
Qty Equipment: 3.00
Grading days/yr: **0.25**

Eliminate Intersection - Tampa Point Blvd at Bayshore Blvd
Project Summary

Includes:

1 100% of Eliminate Intersection at Tampa Point Blvd and Bayshore Blvd 1,000 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	1,000	ft^2	If project includes any demolition, include here
Total Paved Area:	0	ft^2	
Total Disturbed Area:	1,500	ft^2	Total Disturbed Area is usually larger than the building being demolished unless the facility demolished is multi-story. If larger, do not use the sum from above, replace with your own value in cell "C14".
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	6.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tons)	0.04	0.00	0.02	0.00	0.00	0.00
Fugitive Dust Emissions (tons)	0.00	0.00	0.00	0.00	0.02	0.00
Total Project Emissions (tons)	**0.039**	**0.002**	**0.015**	**0.001**	**0.022**	**0.004**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0001%	0.00001%	0.00023%	0.000001%	0.0001%	0.0001%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	1,500	0.03	1	(from "GRADING" below)
Paving:	0	0.00	0	
Demolition:	1,000	0.02	1	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	-	-	-	-	-	-
Demolition	36.51	2.16	14.44	0.73	2.21	2.14
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	78.15	4.74	30.15	1.56	4.75	4.61

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**78.15**	**4.74**	**30.15**	**1.56**	**4.75**	**4.61**
Total Project Combustion Emissions (tons)	**0.0391**	**0.0024**	**0.0151**	**0.0008**	**0.0024**	**0.0023**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	-	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.0	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	0.00	0.00	0.00	0.00
General Construction Activities	0.04	0.02	0.00	0.00
Total	**0.04**	**0.02**	**0.00**	**0.00**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.03 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.03	0.00
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.03	0.02
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.02	0.02
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.02	0.01
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.03	0.01
TOTAL								0.06

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.06
Qty Equipment: 3.00
Grading days/yr: **0.02**

Extend Zemke Ave
Project Summary

Includes:

1 100% of Extend Zemke Avenue 6,000 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	0	ft^2	If project includes any demolition, include here
Total Paved Area:	6,000	ft^2	
Total Disturbed Area:	12,000	ft^2	Roadway Improvement Projects could disturb more than the paved area. If so, cell "C14" should be c
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	6.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.04	0.00	0.02	0.00	0.00	0.00
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	0.25	0.04
Total Project Emissions (tpy)	**0.044**	**0.003**	**0.017**	**0.001**	**0.255**	**0.045**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0001%	0.00001%	0.00026%	0.000001%	0.0011%	0.0006%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	12,000	0.28	1	(from "GRADING" below)
Paving:	6,000	0.14	1	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	45.37	2.61	18.58	0.91	2.78	2.69
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	87.01	5.18	34.29	1.74	5.32	5.16

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**87.01**	**5.18**	**34.29**	**1.74**	**5.32**	**5.16**
Total Project Combustion Emissions (tons)	**0.0435**	**0.0026**	**0.0171**	**0.0009**	**0.0027**	**0.0026**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.1	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.1	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	0.35	0.17	0.03	0.02
General Construction Activities	0.16	0.08	0.01	0.00
Total	**0.50**	**0.25**	**0.04**	**0.02**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.28 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.28	0.03
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.28	0.13
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.14	0.14
2315 120 5220	Backfill	Structural, common earth, 150' l	1,950	cu. yd/day	2.42	0.41	0.14	0.06
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.28	0.10
TOTAL								0.46

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.46
Qty Equipment: 3.00
Grading days/yr: **0.15**

Widen South Boundary Boulevard
Project Summary

Includes:

1 100% of Extend South Boundary Boulevard 8,400 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	0	ft^2	If project includes any demolition, include here
Total Paved Area:	8,400	ft^2	
Total Disturbed Area:	16,800	ft^2	Roadway Improvement Projects could disturb more than the paved area. If so, cell "C14" should be
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	6.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.04	0.00	0.02	0.00	0.00	0.00
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	0.35	0.06
Total Project Emissions (tpy)	**0.044**	**0.003**	**0.017**	**0.001**	**0.356**	**0.062**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0001%	0.00001%	0.00026%	0.000001%	0.0016%	0.0009%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	16,800	0.39	1	(from "GRADING" below)
Paving:	8,400	0.19	1	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	45.37	2.61	18.58	0.91	2.78	2.69
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	87.01	5.18	34.29	1.74	5.32	5.16

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**87.01**	**5.18**	**34.29**	**1.74**	**5.32**	**5.16**
Total Project Combustion Emissions (tons)	**0.0435**	**0.0026**	**0.0171**	**0.0009**	**0.0027**	**0.0026**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency

(assume 50% control efficiency for PM10 and PM2.5 emissions)	0.50		EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	0.49	0.24	0.05	0.02
General Construction Activities	0.22	0.11	0.01	0.01
Total	**0.71**	**0.35**	**0.06**	**0.03**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.39 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.39	0.05
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.39	0.19
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.19	0.19
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.19	0.08
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.39	0.14
TOTAL								0.65

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.65
Qty Equipment: 3.00
Grading days/yr: **0.22**

Extend Great Egret Street
Project Summary

Includes:

1 100% of Extend Great Egret Street 24,000 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	0	ft^2	If project includes any demolition, include here
Total Paved Area:	24,000	ft^2	
Total Disturbed Area:	48,000	ft^2	Roadway Improvement Projects could disturb more than the paved area. If so, cell "C14" should be
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	6.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.09	0.01	0.04	0.00	0.01	0.01
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	1.01	0.17
Total Project Emissions (tpy)	**0.089**	**0.005**	**0.036**	**0.002**	**1.014**	**0.176**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0002%	0.00001%	0.00055%	0.000003%	0.0045%	0.0024%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	48,000	1.10	1	(from "GRADING" below)
Paving:	24,000	0.55	3	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	136.10	7.82	55.74	2.72	8.33	8.08
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	177.74	10.39	71.45	3.55	10.87	10.55

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**177.74**	**10.39**	**71.45**	**3.55**	**10.87**	**10.55**
Total Project Combustion Emissions (tons)	**0.0889**	**0.0052**	**0.0357**	**0.0018**	**0.0054**	**0.0053**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.6	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.6	acres

Project Emissions (tons/year)

	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	1.39	0.69	0.14	0.07
General Construction Activities	0.63	0.31	0.03	0.02
Total	**2.02**	**1.01**	**0.17**	**0.09**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 1.10 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	1.10	0.14
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	1.10	0.54
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.55	0.56
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.55	0.23
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	1.10	0.39
TOTAL								1.85

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 1.85
Qty Equipment: 3.00
Grading days/yr: **0.62**

Construct Parking Lot
Project Summary

Includes:

1 100% of Construct Parking Lot — 10,000 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	0	ft^2	If project includes any demolition, include here
Total Paved Area:	10,000	ft^2	
Total Disturbed Area:	20,000	ft^2	Roadway Improvement Projects could disturb more than the paved area. If so, cell "C14" should be
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	6.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.07	0.00	0.03	0.00	0.00	0.00
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	0.42	0.07
Total Project Emissions (tpy)	**0.066**	**0.004**	**0.026**	**0.001**	**0.424**	**0.075**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0001%	0.00001%	0.00041%	0.000002%	0.0019%	0.0010%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	20,000	0.46	1	(from "GRADING" below)
Paving:	10,000	0.23	2	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	90.73	5.21	37.16	1.81	5.55	5.39
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	132.38	7.79	52.87	2.65	8.10	7.85

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**132.38**	**7.79**	**52.87**	**2.65**	**8.10**	**7.85**
Total Project Combustion Emissions (tons)	**0.0662**	**0.0039**	**0.0264**	**0.0013**	**0.0040**	**0.0039**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	0.58	0.29	0.06	0.03
General Construction Activities	0.26	0.13	0.01	0.01
Total	**0.84**	**0.42**	**0.07**	**0.04**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.46 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.46	0.06
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.46	0.22
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.23	0.23
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.23	0.09
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.46	0.16
TOTAL								0.77

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.77
Qty Equipment: 3.00
Grading days/yr: **0.26**

Relocate Aircraft Wash Rack
Project Summary

Includes:

1 100% of Relocate Aircraft Wash Rack 10,000 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2
Total Demolished Area:	0	ft^2
Total Paved Area:	36,870	ft^2
Total Disturbed Area:	0	ft^2
Construction Duration:	1.0	year(s)
Paving Duration:	12.0	months
Annual Construction Activity:	230	days/yr

Total Disturbed Area is usually larger than the building being demolished unless the facility demolished is multi-story. If larger, do not use the sum from above, replace with your own value in cell "C14".

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.11	0.01	0.05	0.00	0.01	0.01
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	1.17	0.33
Total Project Emissions (tpy)	**0.11**	**0.01**	**0.05**	**0.00**	**1.17**	**0.34**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0002%	0.00002%	0.00071%	0.000003%	0.0053%	0.0047%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)					
		NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	0	0.00	0	(from "GRADING" below)
Paving:	36,870	0.85	5	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	-	-	-	-	-	-
Paving	226.84	13.03	92.89	4.54	13.88	13.46
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	226.84	13.03	92.89	4.54	13.88	13.46

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**226.84**	**13.03**	**92.89**	**4.54**	**13.88**	**13.46**
Total Project Combustion Emissions (tons)	**0.1134**	**0.0065**	**0.0464**	**0.0023**	**0.0069**	**0.0067**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	12	months
Area	0.8	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	12	months
Area	(0.8)	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	4.27	2.13	0.43	0.21
General Construction Activities	-1.93	-0.96	-0.10	-0.05
Total	**2.34**	**1.17**	**0.33**	**0.17**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 0.00 acres/yr (from "COMBUSTION" above)

Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.

Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.00	0.00
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.00	0.00
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.00	0.00
2315 120 5220	Backfill	Structural, common earth, 150' l	1,950	cu. yd/day	2.42	0.41	0.00	0.00
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.00	0.00
	TOTAL							0.00

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.00
Qty Equipment: 3.00
Grading days/yr: **0.00**

Other Potential Roadway Improvements
Project Summary

Includes:

1 100% of Other Potential Roadway Improvements 26,800 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	0	ft^2	If project includes any demolition, include here
Total Paved Area:	26,800	ft^2	
Total Disturbed Area:	40,200	ft^2	Roadway Improvement Projects could disturb more than the paved area. If so, cell "C14" should be ch
Construction Duration:	1.0	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	12.0	months	
Annual Construction Activity:	230	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.09	0.01	0.04	0.00	0.01	0.01
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	1.90	0.35
Total Project Emissions (tpy)	**0.089**	**0.005**	**0.036**	**0.002**	**1.907**	**0.350**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0002%	0.00001%	0.00055%	0.000003%	0.0085%	0.0049%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	40,200	0.92	1	(from "GRADING" below)
Paving:	26,800	0.62	3	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	136.10	7.82	55.74	2.72	8.33	8.08
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	177.74	10.39	71.45	3.55	10.87	10.55

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**177.74**	**10.39**	**71.45**	**3.55**	**10.87**	**10.55**
Total Project Combustion Emissions (tons)	**0.0889**	**0.0052**	**0.0357**	**0.0018**	**0.0054**	**0.0053**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	12	months
Area	0.6	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	12	months
Area	0.3	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	3.10	1.55	0.31	0.16
General Construction Activities	0.70	0.35	0.04	0.02
Total	**3.80**	**1.90**	**0.35**	**0.17**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.92 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.92	0.12
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.92	0.45
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.46	0.47
2315 120 5220	Backfill	Structural, common earth, 150' l	1,950	cu. yd/day	2.42	0.41	0.46	0.19
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.92	0.32
	TOTAL							1.55

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 1.55
Qty Equipment: 3.00
Grading days/yr: **0.52**

Construct Parking Lot - Alternate Location
Project Summary

Includes:

1 100% of Construct Parking Lot - Alternate Location 10,000 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	0	ft^2	If project includes any demolition, include here
Total Paved Area:	10,000	ft^2	
Total Disturbed Area:	20,000	ft^2	Roadway Improvement Projects could disturb more than the paved area. If so, cell "C14" should be
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	6.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.07	0.00	0.03	0.00	0.00	0.00
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	0.42	0.07
Total Project Emissions (tpy)	**0.066**	**0.004**	**0.026**	**0.001**	**0.424**	**0.075**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0001%	0.00001%	0.00041%	0.000002%	0.0019%	0.0010%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	20,000	0.46	1	(from "GRADING" below)
Paving:	10,000	0.23	2	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	90.73	5.21	37.16	1.81	5.55	5.39
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	132.38	7.79	52.87	2.65	8.10	7.85

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**132.38**	**7.79**	**52.87**	**2.65**	**8.10**	**7.85**
Total Project Combustion Emissions (tons)	**0.0662**	**0.0039**	**0.0264**	**0.0013**	**0.0040**	**0.0039**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10	EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.2	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	0.58	0.29	0.06	0.03
General Construction Activities	0.26	0.13	0.01	0.01
Total	**0.84**	**0.42**	**0.07**	**0.04**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.46 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.46	0.06
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.46	0.22
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.23	0.23
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.23	0.09
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.46	0.16
TOTAL								0.77

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.77
Qty Equipment: 3.00
Grading days/yr: **0.26**

Relocate Aircraft Wash Rack - Alternate Location
Project Summary

Includes:

1 100% of Relocate Aircraft Wash Rack - Alternate Location 10,000 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2
Total Demolished Area:	0	ft^2
Total Paved Area:	36,870	ft^2
Total Disturbed Area:	55,305	ft^2
Construction Duration:	1.0	year(s)
Paving Duration:	12.0	months
Annual Construction Activity:	230	days/yr

Total Disturbed Area is usually larger than the building being demolished unless the facility demolished is multi-story. If larger, do not use the sum from above, replace with your own value in cell "C14".

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tpy)	0.13	0.01	0.05	0.00	0.01	0.01
Fugitive Dust Emissions (tpy)	0.00	0.00	0.00	0.00	2.62	0.47
Total Project Emissions (tpy)	**0.13**	**0.01**	**0.05**	**0.00**	**2.62**	**0.48**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0002%	0.00002%	0.00083%	0.000004%	0.0117%	0.0067%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	55,305	1.27	1	(from "GRADING" below)
Paving:	36,870	0.85	5	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	226.84	13.03	92.89	4.54	13.88	13.46
Demolition	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	268.48	15.61	108.60	5.37	16.43	15.93

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**268.48**	**15.61**	**108.60**	**5.37**	**16.43**	**15.93**
Total Project Combustion Emissions (tons)	**0.1342**	**0.0078**	**0.0543**	**0.0027**	**0.0082**	**0.0080**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10		EPA 2001; EPA 2006

Control Efficiency
(assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	12	months
Area	0.8	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	12	months
Area	0.4	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	4.27	2.13	0.43	0.21
General Construction Activities	0.96	0.48	0.05	0.02
Total	**5.23**	**2.62**	**0.47**	**0.24**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 1.27 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	1.27	0.16
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	1.27	0.62
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.63	0.64
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.63	0.26
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	1.27	0.45
TOTAL								2.13

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 2.13
Qty Equipment: 3.00
Grading days/yr: **0.71**

Modification to Aligment of Tampa Point Blvd
Project Summary

Includes:

1 100% of Modification to Aligment of Tampa Point Blvd 3,120 ft^2

Assumptions:
All land disturbance/grading area includes building construction, utility installation, landscaping, and paving operations.

Total Building Construction Area:	0	ft^2	
Total Demolished Area:	3,800	ft^2	If project includes any demolition, include here
Total Paved Area:	3,120	ft^2	
			Total Disturbed Area is usually larger than the building being demolished unless the facility demolished is multi-story. If larger, do not use the sum from above, replace with your own value in cell "C14".
Total Disturbed Area:	5,700	ft^2	
Construction Duration:	0.5	year(s)	If construction duration is less than a year, change the value.
Paving Duration:	6.0	months	
Annual Construction Activity:	115	days/yr	

Project Proposed for CY 2011

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Combustion Emissions (tons)	0.11	0.01	0.04	0.00	0.01	0.01
Fugitive Dust Emissions (tons)	0.00	0.00	0.00	0.00	0.12	0.02
Total Project Emissions (tons)	**0.113**	**0.007**	**0.045**	**0.002**	**0.131**	**0.028**
Hillsborough County Emissions (tpy)	58,191	34,880	6,517	65,890	22,379	7,221
Project Percentage (%)	0.0002%	0.00002%	0.00068%	0.000003%	0.0006%	0.0004%
Regionally Significant? (more than 10%)	**no**	**no**	**no**	**no**	**no**	**no**

Combustion Emissions

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Stationary							
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22
Mobile (non-road)							
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30
Total per 10 acres of activity	1	3.57	0.37	1.57	0.07	0.31	0.30

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day) NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.071	0.309	0.300
Architectural Coating**			0.000				

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	5,700	0.13	1	(from "GRADING" below)
Paving:	3,120	0.07	1	
Demolition:	3,800	0.09	4	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47
Paving	45.37	2.61	18.58	0.91	2.78	2.69
Demolition	138.74	8.22	54.89	2.77	8.39	8.14
Building Construction	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-
Total Emissions (lbs):	225.75	13.41	89.18	4.51	13.71	13.30

Results: Total Project Annual Emission Rates

	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Total Project Combustion Emissions (lbs)	**225.75**	**13.41**	**89.18**	**4.51**	**13.71**	**13.30**
Total Project Combustion Emissions (tons)	**0.1129**	**0.0067**	**0.0446**	**0.0023**	**0.0069**	**0.0066**

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier (10% of PM10 emissions assumed to be PM2.5)	0.10	EPA 2001; EPA 2006

Control Efficiency (assume 50% control efficiency for PM10 and PM2.5 emissions) 0.50 EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.1	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	6	months
Area	0.1	acres

Project Emissions (tons/year)

	PM_{10} uncontrolled	PM_{10} controlled	$PM_{2.5}$ uncontrolled	$PM_{2.5}$ controlled
New Roadway Construction	0.18	0.09	0.02	0.01
General Construction Activities	0.07	0.03	0.00	0.00
Total	**0.25**	**0.12**	**0.02**	**0.01**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.13 acres/yr (from "COMBUSTION" above)
Qty Equipment: **3.00** (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.13	0.02
2230 500 0300	Stripping	Topsoil & stockpiling, adverse s	1,650	cu. yd/day	2.05	0.49	0.13	0.06
2315 432 5220	Excavation	Bulk, open site, common earth,	800	cu. yd/day	0.99	1.01	0.07	0.07
2315 120 5220	Backfill	Structural, common earth, 150'	1,950	cu. yd/day	2.42	0.41	0.07	0.03
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passe	2,300	cu. yd/day	2.85	0.35	0.13	0.05
TOTAL								0.22

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.22
Qty Equipment: 3.00
Grading days/yr: **0.07**